JPRS-ELS-86-002

31 DECEMBER 1986

Europe/Latin America Report

SCIENCE AND TECHNOLOGY

FBIS FOREIGN BROADCAST INFORMATION SERVICE

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL
INFORMATION SERVICE
SPRINGFIELD, VA. 22161

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS-ELS-86-002

31 DECEMBER 1986

EUROPE/LATIN AMERICA REPORT

SCIENCE AND TECHNOLOGY

CONTENTS

MICROELECTRONICS

SCIENTIFIC AND INDUSTRIAL POLICY

EAST EUROPE

/9987

ESA COUNCIL APPROVES 'EUROPEANIZATION' OF HERMES PROJECT

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 437, 10 Aug 86 pp 10-11

[Text] The Council of the European Space Agency (ESA) has agreed to the "Europeanization" of HERMES, the French manned spacecraft project by approving enabling overtures for development of a preliminary program. This decision was in response to the recommendation made in Rome during the council's ministerial-level meeting in January 1985 to integrate this program into the ESA optional programs as soon as possible. France has submitted a detailed programs as soon as possible. France has submitted a detailed program proposal to the ESA member states.

HERMES is a manned spacecraft equipped with delta wings which will be placed in low earth orbits by the Ariane 5 launcher and will glide back to earth and land on a runway upon completion of its mission. The missions planned for HERMES primarily involve the technical support of Columbus components (platforms, compression modules) and later of the independent European space station.

With the approval of the development of the program, the council has emphasized the political intention of the ESA member states to aim at an independent European infrastructure in space, as it had done previously with the decisions concerning the development of a preliminary program for the other infrastructure components, namely Columbus, Ariane 5, and a data relay satellite.

The HERMES preliminary program, which continues the studies previously undertaken by France (CNES [National Center for Space Studies]) under bilateral agreements, will be carried out from the fall of 1986 to June 1987. Its primary aim is to collect the technical data necessary to complete the program proposal with compatibility to the other elements of the European space infrastructure, as well as cost estimates, deadlines, and industrial structure. Another subject covered by the preliminary program is a series of industrial tasks on the detailed definition of the spacecraft and related ground facilities as well as the necessary basic technological studies. At the same time, studies will continue on HERMES missions and utilization, along with the preliminary definition of the extra-vehicular maneuver technology which is of utmost importance for the HERMES operation.

Requirements will be established during the initial stage of the program so that the ESA member states will be able to decide on a HERMES development program in the middle of 1987, when they also have to decide on the other elements of the European space infrastructure. With this schedule, the first HERMES launch can be expected for 1995-96.

FINNISH SATELLITE TESTING SYSTEM TO SWEDISH SPACE AGENCY

Helsinki HELSINGIN SANOMAT in Finnish 21 Oct 86 p 25

[Article: "First Space Technology Contract for State Technological Research Center"]

[Text] Finland has obtained its first contract for the supplying of space technology via international competitive bidding. The firm of VTT Technology Oy, owned by the State Technological Research Center (VTT), and VTT's tele-technology laboratory, its chief subcontractor, have contracted to supply the Swedish Rymdbolaget [Space Agency] with a satellite testing system.

VTT won out in competitive bidding in which a number of Swedish firms, among others, participated after tough negotiations that went on through last spring. VTT was unwilling to disclose the sales price. Its bid was not, however, the lowest in the bidding. VTT had two close competitors right down to the last minute.

To Test Tele-X

Rymdbolaget plans to use the so-called IOT (In-Orbit Test) system to properly test Tele-X satellite data communications repeaters. Later it will offer the system for the testing of other countries' satellites too. Rymdbolaget will be supplied with the system on a for-immediate-occupancy basis.

Teletechnology laboratory researcher Antti Laaperi said that VTT's earlier experience with Eutelsat and Tele-X ground stations has finally borne fruit.

He believes that Finland has gotten the system in part because there is no research institute like VTT in Sweden.

Seven or eight high-level specialists will be working in connection with the project. The contract also includes responsibility for long-term servicing and maintenance.

VTT has obtained for its use from Sweden metering equipment worth 5 million markkas and representing the best in the field as well as two computers which are the heart of the metering system. In the courtyard of the teletechnology laboratory in Otaniemi also stands the full trailer that has already been used in testing the Viking satellite.

Delivery Date: Summer 1987

The equipment to be supplied is composed of two parts: the main body of equipment to be installed at the Tele-X ground station near Oslo and a mobile ground station that is to be mounted on the above-mentioned full trailer of a truck. The delivery date will be in the summer of 1987.

The launching of the Tele-X satellite into orbit was most recently postponed this year. According to present plans, the satellite will be launched into orbit in the summer of 1988.

Laaperi believes that the contract will offer VTT opportunities for additional projects along the line of the ESA (European Space Agency). On the other hand, the much-discussed Eureka project is, according to him, more a matter for Finnish business firms than for VTT. One alternative for collaboration could, however, be the Soviet Union.

"But the trade balance between the two countries could develop into a problem. Since the Soviet Union would like to export rather than import," Laaperi thought.

11,466
CSO: 3698/57

SWEDISH BIOCHEMICAL COMPANIES REGROUPING FOR BIG BUSINESS

Big Deals in Chemistry

Helsinki HUFVUDSTADSBLADET in Swedish 9 Oct 86 p 11

[Article by Lennart Utterstrom]

[Text] Stockholm--On Wednesday two of the largest chemical companies in Sweden and in the Nordic countries revealed major new deals. The much discussed company Fermenta will sell off its agricultural chemistry to American interests. Its competitor, Pharmacia, is purchasing the biochemical research company LKB.

In something of a surprise, Fermenta is selling one of the three "golden eggs" the company has in its corporate basket. The division is being purchased by two American companies which, through this acquisition, will become one of the most interesting agricultural chemistry groups in the world.

Fermenta's principle owner, Refaat El-Sayed, who is simultaneously negotiating the sale of the entire concern to the Italian chemical giant Montedison, does not believe that the loss of this division will affect the interest of the Italian purchasers in the remainder of the company.

It is not known how much the United States companies paid for their new acquisition. But the most interesting question in this connection is whether this deal means that, despite everything, Fermenta will be gradually dismembered and its parts placed into various hands.

The sale took place because the market and, consequently, profit margins are shrinking, El-Sayed explained after the deal was made public.

It is important that some other company take over these activities and carry out long-range planning. The negotiations with Montedison are continuing as before.

But the question more and more people are asking is whether the Italians have had enough of Fermenta's twists and turns in its dealings with the Milan-based company. Why would it want to purchase a maimed Fermenta? After all, the

preliminary agreement with the Swedes states that the Italian company wants to take over the entire concern to provide the company with what it lacks. The agricultural chemistry division is an important piece in this connection.

Stock Sales Stopped

Pharmacia of Uppsala is going in the opposite direction. According to all indications, since earlier this year when a possible merger with Fermenta fell through, Pharmacia has been attempting to compensate this loss by purchasing the biochemical company LKT, with its 1,600 employees.

The first sign of an impending deal came on Wednesday morning, when transactions involving the two companies' stock were stopped, as was the trade of stock in LKB's principle owner, Incentive.

Along with Fermenta, LKB is Sweden's only large company in the biochemical field. Profits in 1985 amounted to almost 100 million kronor, although its profitability curve was clearly down. The report for the first 8 months of the year, presented the day before yesterday, showed losses of 5 million kronor. The results for the same period in 1985 were 24 million kronor in profits.

For Pharmacia, the takeover means it will both strengthen and complement its own operations. At the same time, it is not completely wrong to say that the pharmaceutical industry is demonstrating new aggressiveness that is strongly reminiscent of Fermenta during the glory days of Refaat El-Sayed.

Pharmacia Buys Competitor LKB

Stockholm SVENSKA DAGBLADET in Swedish 9 Oct 86 pp 1, Part 3, p I

[Article by Lennart Moberg]

[Text] Once again, the biotechnology firm Pharmacia has plans to purchase another company. This time it is the firm's competitor LKB of Bromma near Stockholm.

On Wednesday, Pharmacia, LKB, and the principle owner of LKB all refused to comment on Pharmacia's plans. But stock sales for all three companies were frozen and, according to information received by SVENSKA DAGBLADET, Pharmacia is willing to make LKB an offer. The deal will total many millions, perhaps close to 1 billion kronor.

Since Fermenta's plans to make Pharmacia a subsidiary fell through, Pharmacia has been extremely active. Over a 6-month period, the concern invested about 5 billion kronor in order to grow.

Pharmacia Buying LKB

According to what SVENSKA DAGBLADET has learned, Pharmacia is negotiating the purchase of one of its competitors, LKB of Bromma. If the deal goes through, it will amount to 500 million to 1 billion kronor.

Stock sales for Pharmacia, LKB, and LKB's principle owner Incentive were stopped on Wednesday. None of those involved had any comments, but promised more information on Thursday.

There has been talk in the past about how well LKB would fit into the Pharmacia Concern. In some respects LKB is a competitor and the spheres of activity of the two companies would complement each other.

LKB has two main areas of interest: biotechnological research and the production of instruments and systems for the pharmaceutical industry. Pharmacia is also involved in these areas. At Pharmacia, biotechnological research has served as a base for approaching instrument production. LKB has taken the opposite approach. The company has approached biotechnological research with instrument production as its base.

Clear Advantages

According to observers in the field, a merger would present clear advantages with regard to coordination. Both companies work with separation technology and diagnostics.

LKB has 1,600 employees and about 1 billion kronor in sales. It is owned by Incentive, which holds 60 percent of the share capital and 80 percent of the votes.

The principle owners of incentive are the Wallenberg group and the Lundberg group. Profitability has been down recently at Incentive and its leadership has promised measures to straighten out its finances.

Offensive

With regard to Pharmacia, this represents an additional step in the offensive that began 6 months ago. Last winter Pharmacia was in the process of becoming a subsidiary of Fermenta. There was great uncertainty within the company.

Since April, however, Pharmacia has invested about 5 billion kronor in order to grow. The following are some of its most important transactions:

Last April Pharmacia started a new biotechnology firm, together with Alfa-Laval. It will sell complete production facilities for biotechnological products;

In July Pharmacia announced the purchase of Leo. The price was 3.3 billion kronor;

In August it purchased the American eye lens company Intermedics Inc of California. The purchase price was 0.5 billion kronor;

In September Pharmacia established a new biotechnology research company in the United States;

Now, in all probability, Pharmacia will purchase LKB in October.

Pharmacia-LKB To Take World Lead

Stockholm SVENSKA DAGBLADET in Swedish 10 Oct 86 Part 3, p I

[Article by Lennart Moberg]

[Text] Pharmacia is prepared to pay 1.3 billion kronor for its competitor, LKB of Bromma. At the same time, this will be the last major purchase for some time to come. The restructuring of Pharmacia will now be complete.

"We have now completed our puzzle. We will now consolidate the concern and develop its various companies," Pharmacia executive vice president Erik Danielsson said when Pharmacia's latest major deal was made public in Stockholm on Thursday.

As SVENSKA DAGBLADET reported yesterday, Pharmacia wants to purchase LKB in its entirety. For several weeks Pharmacia has been negotiating with the principle owner of LKB, Incentive, which now holds 61 percent of its share capital.

Pharmacia is purchasing Incentive's entire holdings for 775 million kronor. Pharmacia is now offering other stockholders the same conditions offered to Incentive. This includes the following:

315 kronor for each restricted B-share;

335 kronor for each unrestricted B-share.

This offer is about 25 percent higher than last week's quotations.

One condition, however, is that Pharmacia receive at least 90 percent of the shares, although Pharmacia has the right to complete the deal even if it receives less than 90 percent.

"It is no secret that Sweden needs a new structure in its pharmaceutical industry," Erik Danielsson said. "I believe it would be difficult to find a more logical transaction than the one we presented today."

Pharmacia and LKB will coordinate their resources in biotechnological research and separation technology. With regard to separation technology, Erik Danielsson believes that the two companies will become world leaders.

Pharmacia now believes it has completed its structural changes.

"The program for structural change was drawn up in August of last year," Erik Danielsson said. "Throughout the process, the initiative has come from the Pharmacia leadership and not from our principle owner Volvo, although Volvo has supported our plans all along."

LKB now has 1,600 employees. Even though several parallel operations will now be combined, Erik Danielsson does not believe there will be any personnel reductions.

"We can hold back on new hirings, but there will be no layoffs," Erik Danielsson promised.

It is still unclear, however, what will happen with the LKB management. There have been no negotiations with LKB executive vice president Stig Stendahl and his closest men, according to those involved in the deal.

Incentive has been the principle owner of LKB for 23 years. Its executive vice president, Lars V. Kylberg, had the following comments on the sale:

"This is a natural and good step for LKB. There have been many interested buyers, including foreign companies, but we believe LKB should remain a Swedish company."

Fermenta Sells 3 USA Firms

Stockholm SVENSKA DAGBLADET in Swedish 9 Oct 86 Part 3, p I

[Article by Lennart Moberg]

[Text] Fermenta will sell about one third of the concern. Two American companies will purchase the so-called agrochemical section. Fermenta will realize capital gains of about 700 million kronor.

"We need capital to invest in our veterinary medicine division," the chief of the Fermenta concern, Refaat El-Sayed, said.

SVENSKA DAGBLADET has reported previously on Fermenta's plans to sell its agrochemical division. The Fermenta board made public its plans on Wednesday:

> The agrochemical production at Fermenta Plant Protection in Ohio is being sold to Monsanto Agricultural of St. Louis, United States. Fermenta Plant is now a subsidiary of Fermenta's American subsidiary SDS Biotech.
>
> Cedar Chemical Corporation of Mississippi and New Mexico Potash Company will be sold to another American company. So far, the name of the new purchaser has been kept secret.

Fermenta does not wish to reveal the sale prices, but estimates point to capital gains of 700 million kronor.

The Fermenta leadership also refused to comment on rumors indicating that parts of the Italian subsidiary Pierrel would also be sold.

The three companies that will now be sold to United States firms have combined sales of 1.5 billion kronor. This corresponds to one third of Fermenta's total sales.

Change

Refaat El-Sayed has stated previously that Fermenta's business concept is based on three spheres of activity: veterinary medicine, agrochemistry, and animal feed. Now the major part of one one these areas is being sold. Has Fermenta changed its concept?

"No," Refaat El-Sayed said, " but at present we need capital to invest in veterinary medicine. In the future we will make new investments in agrochemistry, which we believe has a good future. The idea is to invest in different activities at different times."

Fermenta will retain about 10 percent of its agrochemical activities after the sale on Wednesday.

Unclear

This deal comes at a time when it is still unclear whether or not Refaat El-Sayed will sell a major block of shares to the Italian company Montedison. Does Refaat El-Sayed believe that this will affect these negotiations?

"No, I do not believe it will and, what is more, Fermenta must operate the company independently of my negotiations with Montedison."

Montedison has stated previously that it wants to purchase Fermenta in its entirety and not parts of the company. Montedison has become more and more irritated in recent weeks.

Several weeks ago the Montedison management demanded a clear answer from Refaat El-Sayed as to whether or not he was serious about selling the company. Montedison has also threatened to sue El-Sayed if there were no deal.

In a press release, Montedison stated that it was still interested in a deal, but that the company would now reexamine Fermenta to see what it was really worth in terms of money. This seems to mean that Montedison will lower its previous bid. Refaat El-Sayed believed that this previous bid was ridiculously low.

The two sides disagree on more than the price. Montedison wants to purchase 78 percent of the votes, while El-Sayed is only prepared to release 51 percent. This makes a deal more and more improbable.

Information revealed on Wednesday evening also indicated that Procordia, which has purchased 1.5 million of Refaat El-Sayed's 6 million voting shares so far, has options on an additional 3 million A-shares. That would give Procordia at least 40 percent of the votes in the company. A prerequisite for an agreement of this type would be that there would be no deal between Fermenta and Montedison.

Montedison-Fermenta Deal Unlikely

Stockholm SVENSKA DAGBLADET in Swedish 8 Oct 86 Part 3, p I

[Article: "Montedison's Plans Crushed"]

[Text] The purchase of Fermenta by the Italian firm Montedison is becoming more and more unlikely.

According to what TT (TIDNINGARNAS TELEGRAMBYRA) has learned, Fermenta has sold the concern's "golden eggs"--the agrochemical company Fermenta Plant Protection in the United States and parts of the Italian company Pierrel. It is estimated that the deal will give Fermenta capital gains of at least 700 million kronor.

These are precisely the deals Montedison planned to make itself in order to finance the purchase of Fermenta. It now appears that these plans have been crushed.

Fermenta will announce these major new deals on Wednesday.

Fermenta refused to make any new detailed comments on the agreements on Tuesday evening. It was confirmed, however, that the two "golden eggs" are included in the new deals.

Procordia Share in Fermenta

Stockholm SVENSKA DAGBLADET in Swedish 10 Oct 86 Part 3, p IV

[Article by Lennart Moberg]

[Text] Refaat El-Sayed and Procordia have reached an agreement in principle concerning their future cooperation. It gives Procordia the right to purchase gradually more and more stock in Fermenta.

"Procordia and I will have a long-term relationship," Refaat El-Sayed said. He would not say, however, precisely how much Procordia would own in the future.

In the past, Refaat El-Sayed owned 6 million voting A-shares. He later sold 1 million each to Procordia, Industrivarden, and Investment AB Beijer. In addition, Procordia was given an option to purchase an additional 1.5 million shares.

Now Procordia and El-Sayed have signed a new agreement. It gives Procordia the right to increase its influence even more, but the prerequisite for this is that there be no deal between El-Sayed and Montedison.

"Because of the ongoing negotiations, we do not wish to reveal exactly what is said in our agreement," Procordia second vice president Olle Enstam said.

What does Procordia want to do with Fermenta?

"We will not be in any hurry when it comes to our involvement in Fermenta," Olle Enstam said. "We are beginning with 1 million A-shares in order to become familiar with the company. We also have other options we can utilize if we want, but we will also be able to withdraw entirely from the agreements we now have."

On Thursday Refaat El-Sayed was in Milan to continue or conclude his negotiations with Montedison.

9336
CSO: 3698/37

BRIEFS

DEC JOINS FRG ARTIFICIAL INTELLIGENCE RESEARCH--Digital Equipment Corporation (DEC) has reached agreement with the universities of Karlsruhe (prime contractor), Kaiserslautern, and Saarbruecken to cooperate in the special research field of "artificial intelligence" supported by the German Research Association and the Federal Ministry for Research and Technology. It is the third agreement concluded with the University of Karlsruhe within the framework of DEC's research promotion program. The agreement was signed by the spokesman for this special research field, Professor P. Deussen of Karlsruhe, and Ralf Bengsch, DEC marketing director. The program will last 2 years and amounts to DM1.7 million in the form of price reductions on computer hardware and software licenses. [Text] [Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 437, 10 Aug 86 p 12] 8622/12859

CSO: 3698/M016

PHILIPS RESEARCHERS PRODUCE 'QUANTUM WELL' LASER

Duesseldorf VDI NACHRICHTEN in German No 37, 12 Sep 86 p 31

[First two paragraphs are VDI NACHRICHTEN introduction]

[Excerpts] VDI-N, Redhill, 12 Sep 86--Diffraction pattern of an electron beam characterizes the crystal surface.

Molecular beam epitaxy (MBE) is a procedure applied in semiconductor manufacturing which allows the growth of substrate films only one atom thick. In suitably equipped plants, even complex multilayer structures can be obtained. Scientists at the Philips research laboratory have used this technique to manufacture a "quantum well" semiconductor laser which works in the visible wavelength range, and they have developed a two-dimensional electron gas structure with extremely high electron mobility for high frequency circuits.

One possible application of MBE is the manufacture of short wavelength semiconductor lasers for optical recording and reproduction systems. The laser operation in a semiconductor diode is based on the fact that both a conduction band with relatively high energy and a valence band with relatively low energy exist in a semiconductor. When an electron in the conduction band recombines with a hole electron in the valance band, a photon can be generated. The energy of the photon and, therefore, the wavelength of the radiated light, depends on the energy differential between the conduction and valence bands.

Due to the existence of these new quantum states, the structure is called a "quantum well." It forms the basis of a semiconductor type which is able to emit in the visible portion of the spectrum. At Redhill, Philips researchers succeeded in producing laser beams with wavelengths of only 707 nm, with potential wells of only 13 nm thickness. For the researchers this is an important step forward in the operation of gallium arsenide lasers. They expect to find many applications in the area of optical data processing because this wavelength is in the visible portion of the spectrum while "normal" gallium arsenide lasers emit in the infrared range.

Two-Dimensional Electron Cloud in Gallium Arsenide

Gallium arsenide is also an important semiconductor because electrons move faster in this compound than in silicon. The higher mobility of electrons in gallium arsenide already has resulted in faster (higher frequency) electronic circuits. For even faster circuits, the Philips laboratory was able to develop a structure consisting of a layer of aluminum gallium arsenide grown on high purity gallium arsenide. On the interface between these materials, a two-dimensional electron cloud is formed in the gallium arsenide. This "electron gas" can have a mobility which far exceeds that of normal gallium arsenide.

With very pure gallium arsenide a low temperature mobility greater than 100,000 cm^2/Vs was achieved. With two-dimensional electron gas structures, researchers obtained low temperature mobilities of 1,501,000 cm^2/Vs. This may result in transistor structures that are suitable for operation at very high frequencies (about 100 GHz). However, the requirements for such high mobility are high purity of the gallium arsenide, high quality interfaces, and exact control of the thickness of the film right down to the atomic dimension. And this can best be obtained with MBE.

8717/12851
CSO: 3698/M006

EUREKA MINISTERIAL CONFERENCE STRUCTURE DESCRIBED

Paris RECHERCHE TECHNOLOGIE in French No 1, Jan-Mar 86 pp 52-55

[Article: "EUREKA: The Hanover Charter". first paragraph is RECHERCHE TECHNOLOGIE introduction]

[Excerpts] The second Ministerial Conference, held on 6 and 7 November 1985, in Hanover, Germany, represented a new step forward in building a technological Europe. The foreign ministers and the ministers for scientific research from 18 European countries and one member of the European Community Commission (ECC) have in fact reaffirmed their determination to encourage and support, through the EUREKA program, cooperation among European industrial firms and research centers. At the end of the conference, the ministers adopted a basic declaration defining program goals. On this occasion, 10 projects were adopted, 8 of them involving French companies.

Priorities and Criteria

At first, EUREKA projects will deal on a priority basis with products, processes, and services which rely on the following high technology sectors: information and telecommunications, robotics, materials, computer integrated manufacture, biotechnology, marine technologies, laser, and technologies for environmental protection and transport.

EUREKA will also include important research and development projects in the fields of high technology, aiming to create technical conditions for a modern infrastructure, and to resolve transborder problems.

EUREKA is addressed to all suitable applicants, including small and medium-size enterprises and small research institutes.

Technological exchange between European manufacturers and research institutes is the basic condition which will make possible high technological standards for European industry. EUREKA projects will encourage and broaden this exchange.

EUREKA projects will meet the following criteria:

--Satisfy objectives described above;

--Involve cooperation of participants (industrial firms, research institutes) from more than one European country;

--Have potential for a substantial profit from the joint enterprise;

--Require high technology;

--Reflect important technological progress for the product, process, or service involved;

--Be led by participants demonstrating the requisite qualifications, both technical and managerial;

--Involve adequate financial commitment from the participating firms.

General Conditions

EUREKA will receive appropriate support from the European Community and the governments of the participating countries.

The creation of a vast, homogenous, dynamic European economic zone, open to the outside world, is essential to EUREKA's success.

From this point of view, the completion of the European Community's internal market and the application of the common declaration of Luxembourg adopted by the European Community and the EFTA countries will be useful for EUREKA.

Specifically this means that EUREKA marks an acceleration of present efforts aimed at:

--the rapid establishment of common industrial standards;
--the elimination of technical obstacles blocking exchanges, e.g., the mutual recognition of examinations and diplomas;
--the opening up of government purchasing structures.

The European Community and the countries participating in EUREKA will examine the possibility of adopting supplementary support measures for EUREKA.

The actions taken within the EUREKA framework will respect the principles of open international competition.

Project Implementation and Coordination

The Projects

EUREKA projects will be prepared through an intensive exchange of information among firms, research institutes, and, as the situation requires, potential users. In this context, the creation of industrial forums in certain sectors could prove useful for the identification of possible EUREKA projects.

The governments and the commission will encourage the exchange of information so as to keep all parties involved informed of the projects under consideration.

EUREKA projects will stem from consultation between the various partners concerned. The firms and research institutes involved will implement the projects groupings of their own choice.

Partners in a EUREKA project will determine the form of their cooperation based on the characteristics of the particular project. In this regard, it will be the duty of the partners to establish for themselves the modalities of project management and the organization of a project headquarters.

The firms and research institutes participating in a EUREKA project will obtain financing through their own means, through reliance on financial markets, in addition to using public subsidies when granted.

The governments of the countries to which the firms and research institutes participating in an approved project belong, and the European Community Commission if necessary, will determine the project's conformity to the goals and criteria defined for EUREKA. Therefore, the governments and the ECC will jointly inform the Ministerial Conference via their senior representatives when the latter meet. Such a report will include a description of the project, an analysis of its conformity to EUREKA's objectives and criteria, and an indication of any additional measures involving thrid parties. Projects requiring such additional measures may be discussed by the senior representatives at the request of one of them. Procedures will be submitted to examination in the light of the experiments already completed.

After this notification process, EUREKA projects will have to remain open to additional partners whenever the participating parties in the project think it desirable.

Organization

The instrument of coordination will be the EUREKA Ministerial Conference. This conference will be constituted of representatives of the government of the participating countries and of the ECC.

At the end of each meeting, the Ministerial Conference will designate a president for the following meeting. The president will ensure continuity of projects.

It will be the function of the Ministerial Conference to promote the substance, structures, and objectives of EUREKA, as well as to work on the evaluation of results.

The senior representatives of each of the participating countries and of the ECC will meet as a group if necessary to assist the Ministerial Conference in the accomplishment of its duties, and to prepare for its meetings. This will include the preparation of reports on the projects to be presented at the Ministerial Conference.

The group's president will be of the same nationality as the president of the next Ministerial Conference.

The senior represenatives, in accordance with the procedural rules applicable in their own countries, will take measures necessary:

--to encourage the necessary circulation of information in their own countries;

--to encourage contacts between firms and institutes of countries participating in EUREKA to provide necessary information and to encourage project implementation;

--to inform the other senior representatives and to attract their attention to the sectors, technologies, products, and services for which a potential cooperation is desired;

--to transmit to the other senior representatives the information necessary for preparation of EUREKA projects;

--to seek, together with the other senior representatives, solutions to any problems encountered and to consult on project financing.

The senior representatives involved will meet to discuss specific projects.

A secretariat or an intervention structure for EUREKA on a small flexible scale, under the responsibility of the EUREKA Ministerial Conference, will be set up in order to increase EUREKA's openness and efficiency (Footnote 2) (The senior representatives working as a group are invited to consult together before 31 January 1986 regarding the possibilities of setting up such a secretariat.) Its principal duties will be the following:

--to gather and distribute information in order to provide the services of a project cleaning house;

--to help firms and research institutes arrange contacts with partners for EUREKA projects;

--to support the meetings of the Ministerial Conference and of the senior representatives;

--to ensure continuity for the various tasks to be done.

The general makeup of the secretariat should reflect the participation of member countries and non-member countries of the EEC in EUREKA.

The relations with the European Community, as well as the possibility of support from the economic sector of participating countries, should be taken into account.

EUREKA's Rlation With the European Community and Other Existing Forms of European Cooperation

EUREKA projects are not intended to substitute for currently existing

European technological cooperation, such as the European Community programs COST [European Cooperation of Scientific and Technical Research], CERN [European Center for Nuclear Research], the ESA [European Space Agency] projects, bilateral and multilateral cooperation projects, nor does EUREKA intend to jeopardize future development of such projects. EUREKA's goal is, on the contrary, to increase or to round out this cooperation.

European Community members can participate as partners in Eureka projects, through their own research resources, their research and development programs, as well as through their means of financing.

The establishment of suitable general conditions within the European Community and the countries concerned, as well as the creation of a favorable environment for technological cooperation are indispensable to EUREKA's success.

Projects Adopted in Which French Companies Are Participating

Of the 10 projects which were definitely adopted by the Hanover conference, eight involve French companies:

--Production of amorphous silicon
Solems with MDD (FRG);

--Compact vector calculator
Matra with Norsk Data (Norway);

--Personal computer for educational purposes
Thomson with Olivetti (Italy) and Acorn (Great Britain);

--Robot for the textile industry
Lectra Systeme with Effacec, EID, LNETI, IUBI (Portugal);

--Design and production of filtering membranes
Degremont-Lyonnaise des Eaux with De Danske Sukkerfabrikker (Denmark);

--European research network
FRG, Austria, ECC, Finland, France, the Netherlands, Sweden, Switzerland;

--Eurolaser--Power laswer system for manufacturing
Great Britain, Italy, FRG, France;

--Completely optronic laser workshop
Compagnie generale de productique with Comau (Italy) and Lusag (Switzerland);

Two projects adopted at Hanover do not involve French companies:

--Eurotrac: Routes in the troposphere
Spain, Great Britain;

--Kit for sexually transmitted disease
Austria, ECC, Finland, Norway, the Netherlands, FRG.

A meeting of the senior representatives was held in London on 22 and 23 January 1986. Sixteen new projects were presented, 13 of which include French participation. They will be ratified at the next Ministerial Conference in June 1986:

--EUROCIM: Flexible automated factory for the production of electronic equipment (Spain, France, Italy);

--CERISE: European center for synthetic images (France, Luxemburg);

--ES2: Design and automated production of silicon integrated circuits (Austria, Belgium, Finland, France, Great Britain, Sweden, Switzerland, FRG);

--GaAs: Integrated circuits (France, Great Britain);

--Third generation robot for civilian security (Spain, France, FRG, Switzerland);

--Expert systems to handle crisis situations (France, Norway);

--EAST [Eureka Advanced Software Technology]: Software engineering workshop (Denmark, Finland, France, Italy, Switzerland);

--Artificial intelligence (Spain, France, Italy, FRG, Switzerland, Belgium);

--Diane: integrated system for neutronography (Spain, France, FRG);

--Waste destruction using lasers (Belgium, France, the Netherlands);

--Thyristors: components for railway traction (France, Great Britain);

--Chrome substitutes (Austria, Spain, Greece);

--Galeno 2000: medical diagnostic equipment (Denmark, Spain);

--Identification of vehicle noise (Belgium, FRG);

--APEX: information transmission networks between firms (France, Great Britain, Italy);

New materials for cars (France, Italy).

EUREKA SECRETARY GENERAL COMMENTS ON ACCOMPLISHMENTS

Paris ENJEUX in French No 72 Sep 86 pp 32-27

[Interview with Xavier Fels, secretary general of the EUREKA program, date and place not given: "Man of the Month: Eureka: European Assent"]

[Text] ENJEUX: From the Versailles summit to SDI [Strategic Defense Initiative], with ESPRIT and EUREKA programs in between, our era is witnessing the beginning of large programs for research and promotion of advanced technologies.

Europe, once said to lack the political will to have its industrial managers and researchers get together, suddenly has picked up the challenge and has even attracted the attention of its major competitors. Before talking about EUREKA, the main theme of our interview, wouldn't it be useful to draw for us a general picture of the research being carried out in the European Community?

Xavier Fels: Before answering this question, I would like to make a remark.

I am happy to answer ENJEUX's questions for two reasons.

First of all, because I am very dedicated to the standarization policy being carried out both in France and in Europe as a whole. The people responsible for this policy are demonstrating remarkable imagination in finding new solutions to difficult problems in the field of information technology. Second, because EUREKA's projects themselves will have numerous ties with European standardization which will allow better product access to large markets. We will have to work on problems of standards, certification, and quality in a very precise way.

Broadly speaking, Europe has excellent potential for fundamental research. Programs such as ESPRIT, BRITE, and RACE are evidence of research within the European Community. With their own considerable resources and their project selection mechanisms, these programs make for a consolidation of the various efforts of industrial firms and national research centers in the "pre-competitive" sector.

On the other hand, when we look at technological applications of research in the form of products intended for both European and world markets, Europe is

behind other world centers of scientific development. This probably stems from cultural differences and habits, but also from the fact that the decision centers are widely dispersed.

ENJEUX: Directing our discussion to EUREKA, it now has a secretariat and a secretary general.

Since you have been selected for the job, please tell us who you are and describe for us your ideas, your convictions, and the team you intend to bring to the project.

Fels: Undoubtedly, I was offered this position because of my twofold experience, acquired in part at the HEC [French Higher Institute of Commerce] and in part in my government and diplomatic careers.

I have always tried to reconcile geopolitical and strategic concerns with territorial responsibilities particularly in areas where diplomats are not often found, as for example, in the merchant marine with its problems especially involving the export of ships or in the area of international fishing agreements.

As economic adviser at the French embassy in Washington, I was able to assess the merits of American management and to try to find inspiration in American methods.

Finally, my recent responsibilities--up until my nomination to the position of secretary general of EUREKA--as diplomatic adviser to the [French] telecommunications department allowed me to become familiar with technological programs and the structure of Europe. In fact, we were able to make some concrete progress in the European telecommunications sector. If Europe does not keep up and does not progress in this strategic area, we will disappear rapidly and wind up as subcontractors for our competitors, which obviously is not something we hope to see happen.

With respect to the people with whom we hope to manage EUREKA, I would state that we enjoy a good reputation which will allow us to attract the best elements.

The reactions to EUREKA both from businessmen and politicians have been encouraging because they indicate the will of these two sectors to pick up the challenges offered us by the development of new technologies.

The ideas proposed so far have been good with respect to flexibility. There has been no dogmatism, no evidence of preconceived notions. We have to leave to those responsible for the management of projects the task of organizing themselves to attain their goals, i.e., the introduction of competitive products into both the European and world markets. It is up to these people to define what they want and up to national governments to then give them certain advantages; we still have to give some thought to the latter. These advantages have to be designed to provide incentives, and better yet to be interactive; this means that the process of communication must be constant and

efficient. In this context, the role of the secretariat is to assure the best possible information among the various players in the field. The secretariat has to be a communications center which guarantees the openness of projects and their technological potential. This openness should also extend to the bureaucratic level as well, since this is part of our national responsibility.

With respect to my convictions, I would say that EUREKA was created for business firms and leaves the initiative to them. Within this framework, I hope that the secretariat--which will be small in size--will be run like a business itself, that is to say with well-defined goals, functions clearly spelled out, and a staff chosen for its high degree of competence. Europe has every possibility of succeeding in the technological domain. Factors which we often considered handicaps, namely cultural diversity and the decentralization of decisionmaking, can, in fact, be a positive advantage which will allow Europe to remain a central player in contemporary history.

ENJEUX: It is said that EUREKA has already registered more than 70 European projects, but perhaps it would be useful to explain how EUREKA differs from ESPRIT in particular.

Fels: The ESPRIT and EUREKA programs are complementary. EUREKA is more extensive in the number of participating countries--19 compared to 12 for ESPRIT--and also in its field of application because EUREKA goes beyond information technology. The field of application for EUREKA are not delineated in advance.

It is up to the business firms to define their needs and what they consider to have the most technological impact, as long as there is a cooperative agreement between at least two firms or European research centers.

In fact, together with the EEC Commission, the secretariat plans to study the relationships to be established between EUREKA and ESPRIT--and this will be one of its most urgent tasks.

This work will be facilitated by the presence within the secretariat of a representative of the Commission who will play an important role in the development of joint working procedures. In addition, the Commission has already indicated its interest in a certain number of projects and its willingness to finance the secretariat's budget at a level equivalent to that established by several other countries.

All the factors for the success of this collaboration seem to be in place. Thus the two systems will operate independently, but with functional and budgetary ties.

ENJEUX: With respect to EUREKA's operating procedures, how is it financed both on the part of the EEC Commission and on that of industry?

Fels: We will have to await the establishment of the secretariat before I can give you a definite answer.

Nevertheless, what I can tell you now is that each country is free to give firms participating in EUREKA whatever advantages it wants. Certain countries will provide financial advantages in different forms--subsidies, reimbursable loans, tax shelters. Others will envisage these advantages in market terms or in terms of standards.

Within this context and, inasmuch as we have to move rapidly, it will be useful to ensure the openness of both our procedures and our projects. In order to accomplish this, the secretariat will have to develop a database devoted to the projects and to the scientific and technological industrial potential of Europe.

Working from this database, we will publish a document which will present the projects and the different procedures established by the countries participating in EUREKA. It is essential to know what is being done, how and why it is done, to what extent the methods adopted by one country can prove useful to others, etc.

Therefore, there is much innovative and creative work to be done. That is why within the organization of the secretariat, which will be approved next September 29 by the high level committee--which unites representatives of EUREKA's 19 member countries--there will be a person designated to be in charge of procedures and their follow-up.

ENJEUX: Will EUREKA cater exclusively to large firms?

In other words, will the same opportunities and facilities be offered to advanced small and medium-size companies as well?

Fels: EUREKA is favorably disposed to small and medium-size companies.

This program brings together 19 countries within which there are many small and medium-size companies. In certain of these countries, these companies dominate.

In addition, EUREKA can play a very important role with respect to other programs by allowing this category of companies to have access to information on European scientific and technological potential.

By instituting openness through the database system which will really constitute the heart of the secretariat, we will be providing numerous services to small and medium-sized companies.

We will consult them on a permanent basis in order to hear their desires and to define the operating procedures most useful to them. It is thanks to this contact that we will be able to fine tune our proposals.

Finally, it will be useful to test these proposals in each of EUREKA's member countries with those responsible for the various areas working on the project.

But, if we make this effort for small and medium-size companies, we must also incolce large companies. These latter often have stronger research resources, but they are not always aware of everything going on in Europe in new technology. This new technology is, in fact, the area of concern of small groups where there is much creativity and where bureaucratic red tape has not yet stifled innovation.

ENJEUX: Now that you have discussed the question of financing, there is still the problem of implementation. Have there been any tangible results yet?

Fels: Since our first projects were launched barely a year ago, it is difficult to discuss with you today the subject of tangible results in terms of products. Even though, I have to admit that this is our most important area because it is our products and their market success which will make for EUREKA's credibility. These results can also be interpreted in terms of signals, high visibility, our image, and our hopes. And it must be said that our first results have been satisfactory in this respect. The media reacted positively to the decisions made in London at the end of June by the ministers of research and industry of the 18 member countries, most notably the decision to establish a EUREKA general secretariat in Brussels.

ENJEUX: How do you see the advent of EUREKA affecting the completion of Europe's internal market (the Common Market as well as the EFTA [European Free Trade Association]) and what effect will it have on Europe's ability to export?

Fels: We can expect some very important results. However, we should not look at EUREKA as a new mechanism for completing Europe's internal market.

The unification of the European market is an economic policy goal of all the nations in Europe and of the European institutions responsible for making this unification process move forward.

The European Community and its secular arm, the Commission of European Communities, which has a lot of power particularly in the litigation field, have established this as a priority goal. The EFTA is also considering--as one of its principal objectives--the elimination of non-tariff barriers within the customs union and in Europe as a whole. With this as a goal, it cooperates closely with the European Community. Within this context, EUREKA's role is to create a dynamic structure to introduce into the market products which have been developed precisely for this purpose by various European business firms working in close cooperation.

Political decisions are very important, of course; they are an indispensable part of the process. But if no joint products are produced, nothing will change because, old habits being what they are, consumers will continue to

to buy domestic products and all the old protectionist tendencies, reinforced by mechanisms which are often very subtle, will persist.

On the other hand, if joint products are developed, each of the countries participating in the development, and also all member countries, will have a vested interest in customs-free interchange and in the largest possible market.

As for the world market, I think that Europe has suffered up until now from a fragmentation of its own market and from the fact that it has not reached the critical mass necessary to launch products with production costs sufficiently low to compete with other producing countries.

Certainly European high-tech products are already sold all over the world. But, by developing products jointly as we can do within the EUREKA framework, we will arrive at economies of scale which will allow European producers once again to be a force in the world market, by our interactive operating procedures and by the simple fact of market size.

I can think of a specific example: the telecommunications field, where there are, among other things, too many competing transmission systems. If we succeed in consolidating on one side the major buyers and on the other the major builders with only two or three groups competing with each other, we will facilitate both the development and the success on the world market of broadband systems capable of transmitting polyvalent digital information (voice, data and images).

ENJEUX: Will the standardization spirit blow new life into EUREKA as it already has stimulated ESPRIT?

Fels: I hope so. Standardization is an area with a lot of impact. I will be very careful to ensure that EUREKA does everything possible to promote the logic of the marketplace I have just described.

The person responsible in the secretariat for working on the advantages offered by EUREKA will have to pay a lot of attention to the question of standardization.

At present it is difficult to get into the details of the mechanisms which will be established, but everyone familiar with standardization knows the advantages it introduces in terms of opening markets, of reducing production costs, in other words, of favoring creativity.

In this respect, the ISDN, the Integrated Services Digital Network, which is a European idea, is a good example of the success of standardization in a very advanced technological field, which will play an important role in the Community's new markets for telecommunications systems, but also in the world marketplace. There are many other examples I could mention.

One can be proud of what has already been undertaken in Europe. EUREKA takes its inspiration from exactly the same spirit, that is, a spirit of closeness to the company and closeness to the economic players, with the objective of opening new markets.

[Box, p 34]

EUREKA's Third Conference

The ministers of 18 European countries and one member of the Commission of European Communities meeting in London on 30 June 1986 for the third EUREKA ministerial conference approved agreements for 62 EUREKA projects, the total value of which is estimated to be two trillion ECU, in addition to the 10 projects (list published in ENJEUX, No 65, January 1986) announced at the conclusion of the second EUREKA ministerial conference in November, 1985.

At the conclusion of this meeting, the ministers of the countries participating in the program also decided to establish an independent secretariat to consolidate the existing system for collecting and sharing information concerning cooperation within the framework of the EUREKA structure. The intent is to facilitate ministerial and EUREKA senior representatives meetings and to support business firms and research organizations.

For this purpose, the ministers signed a memorandum of agreement describing the duties, the structure, and the financing of the secretariat which will be set up in Brussels. They also agreed that the first executive secretary would be Mr Xavier Fels.

The ministers and the member of the Commission also agreed on operating prodedures within EUREKA concerning cooperative projects and project proposals. These procedures will be subject to revision based on experience. They approved a recommendation of the Group of Senior Representatives according to which it will be up to the participants in a EUREKA project to determine the modalities for protecting and assigning copyright for the intellectual property generated by the project.

The ministers and the member of the Commission approved EUREKA membership for Iceland based on its membership in the European Free Trade Association.

Sweden, which assumed the presidency of EUREKA, will host the fourth EUREKA ministerial conference in Stockholm during the second quarter of 1986.

EUREKA Projects With French Participation

This list contains only projects in which French companies are involved, i.e., 40 projects out of the 62 approved on June 30, 1986, at the third EUREKA conference.

(A=AUSTRIA; B=BELGIUM; DK=DENMARK; FI=FINLAND; FR=FRANCE; FRG=FEDERAL REPUBLIC OF GERMANY; GB=GREAT BRITAIN; I=ITALY; L=LUXEMBURG; N=NORWAY; NL-NETHERLANDS; SP=SPAIN; SWE=SWEDEN; SWI=SWITZERLAND.)

Project Title: Broadband Digital Transmission System: Development of an interconnection switchbox for a broadband integrated digital network.

Manufacturers Involved: CIT ALCATEL (FR); PLESSEY (GB); INTALTEL (I).

Cost (MG-Million Francs): 1,120 MF (French share: 373 MF).

Duration: 5 years.

Project Title: CARMAT 2000: New design for automobile bodies using new materials from the very beginning in order to obtain substantially lower costs.

Manufacturers Involved: PEUGEOT S.A. (FR); ICI (GB); BASF (FRG); DSM (NL); VITROLEX ITALIA (I); CRISTALERIA ESPANOLA (SP).

Cost: 417 MF (French share: 252 MF).

Duration: 5 years (including a 2-year design phase--94 MF in France).

Project Title: Flexible Automated Factory For Production Of Electronic Devices: Design and production of a group of flexible automated workshops for the production of integrated circuit boards.

Manufacturers Involved: EUROSOFT (FR); ISEL (SP); CSEA (I).

Cost: 200 MF (French share: 100 MF).

Duration: 5 years (including a 1-year preliminary phase).

Project Title: CERISE (European Center for New Synthetic Image Technology): Development of expertise in data processing technology and in production of European electronic devices: subsequent development of synthetic image programs for television and industry.

Manufacturers Involved: SESA (FR); RTL PRODUCTIONS (L).

Cost: 56 MF (French share: 28 MF).

Duration: 5 years.

Project Title: ES 2 (European Silicon Structure): Development of a European industrial infrastructure for research into and production of CMOS integrated circuits with substantially improved costs and production times.

Manufacturers Involved: BULL (FR); PHILLIPS (NL); B.Ae (GB); OLIVETTI (I). All these companies have a capital share in the ES 2 firm.

Cost: 536 MF (French share: 412 MF).

Duration: 3 years.

Project Title: GaAs Integrated Circuits: Study and development of fast integrated circuit design and production procedures.

Manufacturers Involved: THOMSON Semiconductors (FR); GEC (GB).

Cost: 494 MF (French share: 247 MF).

Duration: 3 years.

Project Title: Robots For Civilian Security (A.M.R. ADVANCED MOBILE ROBOT): Development of two kinds of prototype robots adapted to the urban and natural environments and intended for civilian security.

Manufacturers Involved: MATRA CEA (FR); CASA (SP); ENEA (I).

Cost: 700 MF (French share: 300 MF).

Duration: 5 years (including a 1-year design phase--73 MF).

Project Title: MENTOR: Development of a reliable expert system for forecasting analysis, detection, and situation diagnosis, for application in the peaceful defense sector, management of complex industrial plants.

Manufacturers Involved: SNIAS (FR); DET NORSK VERITAS (N).

Cost: 190 MF (French share: 125 MF).

Duration: 5 years (including a 1-year design phase--10 MF).

Project Title: EAST (EUREKA Advanced Software Technology): Development of software workshops for three main application areas: management data processing and its applications and artificial intelligence.

Manufacturers Involved: SFGL (Societe Francaise de Genie Logiciel) (FR); CRI (DK); NOKIA (FI); CIR (SWI); SOLEMIA (I).

Cost: 761 MF (French share: 342 MF).

Duration: 6 years.

Project Title: PARADI: Artificial intelligence applied to the development of a management system of research, production, and administrative functions, which will allow meeting deadlines, minimizing inventory, reducing current expenses, reduction of and optimizing personnel practices.

Manufacturers Involved: SNIAS (FR); ASBY (B); AERITALIA (I); MATRICI (SP); BROWN BOVERI (SWI); IKOSS (FRG).

Cost: 200 MF (French share: 80 MF).

Duration: 6 years.

Project Title: DIANE (Mobile Neutron Radioscopy Device): Development of a mobile device for neutron radioscopy particularly suitable for nondestructive control of complex of large scale systems in a manufacturing environment.

Manufacturers Involved: SODERN (FR); DORNIER (FRG); SENER (SP).

Cost: 100 MF (French share: 52 MF).

Duration: 5 years.

Project Title: Laser Destruction of Toxic Substances: Destruction of very toxic industrial wastes, through the use of high power laser beams, with possible extension to the detection of toxic substances.

Manufacturers Involved: RHONE-POULENC (FR); SOLVAY (B); AKZO (NL); MONTEDISON (I).

Cost: 60 MF (French share: 30 MF).

Duration: 5 years.

Project Title: Development of GTO Thyristors: Development of a range of powerful electronic components.

Manufacturers Involved: Thomson Seniconductors (FR); GEC (GB).

Cost: 130 MF (French share: 65 MF).

Duration: 2 years.

Project Title: APEX (Advanced Project For European Information Exchange): Development of a pilot system for industrial information exchange within the air and space industry.

Manufacturers Involved: SNIAS (FR); AERITALIA (I); BRITISH AEROSPACE (GB); CASA (SP).

Cost: 200 MF (French share: 70 MF).

Duration: 5 years.

Project Title: Metal and Ceramic Composites for Cars: Design and production of industrial prototypes of new generation high performance parts for cars, using new materials and new shaping procedures.

Manufacturers Involved: PECHINEY (FR); FIAT (I).

Cost: 84 MF (French share: 49 MF).

Duration: 5 years.

Project Title: Ceramic Coated Turbine: Production of two prototypes of ceramic coated turbines, one a 5-MW industrial turbine and the other a 2-MW turbine.

Manufacturers Involved: SEP (FR); VOLVO (SWE); ALFA ROMEO (I).

Cost: 110 MF (French share: 70 MF).

Duration: 5 years.

Project Title: Modular Image Processor: Development of a highly integrated specialized machine, capable of assembling, on demand, several specific processing modules.

Manufacturers Involved: TRT (FR); CONTEXTVISION (SWE).

Cost: 60 MF (French share: 34 MF).

Duration: 3 years.

Project Title: Factory-Producible Urban Infrastructure: Production of a factory-producible urban infrastructure for the collection management of heat energy and new networks (optical fibers, telecommunications, data processing, etc.).

Manufacturers Involved: BONNA (FR); ZUBLIN (FRG); CHARCON TUNNELS (GB); COGEFAR COSTRUZIONI GENERALI (I).

Cost: 64 MF (French share: 25.6 MF).

Duration: 5 years.

Project Title: Light weight Structures for the Transportation Sector: Development of new intermediate products and new assembly technologies allowing weight reduction in structures intended for the transportation sector.

Manufacturers Involved: CEGEDUR PECHINEY (FR); VAW (FRG).

Cost: 84 MF (French share: 48 MF).

Duration: 4 years.

Project Title: ESF (European Software Factory): Development of software engineering workshops to allow productivity increases in the areas of data processing in management, telecommunications, and manufacturing.

Manufacturers Involved: CAP GEMINI SOGETI (FR); NIXDORF (FRG).

Cost: 2,218 MF (French share: 890 MF).

Duration: 10 years (including an 18-month design phase--25 MF).

Project Title: Prometheus: Development of a comprehensive system permitting improvements in the flow and safety of road traffic in Europe.

Manufacturers Involved: Renault (FR); FIAT (I); Daimler Benz (FRG); British Leyland (GB).

Cost: 1,400 MF (French share: 350 MF).

Duration: 8 years (including a 1-year design phase with a French share of 27 MF).

Project Title: Ceramic Diesel Motor: Use of SiC-SiC composite ceramics in diesel motors to improve output. (This project should be extended starting in 1987 to include research into new designs using new materials for diesel motors.)

Manufacturers Involved: SEP (FR); MAN (RFG).

Cost: 46 MF (French share: 23 MF).

Duration: 5 years.

Project Title: CARMINAT: Development of reception, transmission, processing, and data display system intended to improve security of road traffic.

Manufacturers Involved: Renault (FR); Philips (NL).

Cost: 350 MF (French share: 240 MF).

Duration: 4 years.

Project Title: Sunflower Drought Resistance: Production of varieties of drought--and cold resistant sunflowers.

Manufacturers Involved: Rhone Poulenc Agrochimie (FR); INSECTIDAS CONDOR S.A. (SP).

Cost: 27 MF (French share: 3 MF).

Duration: --

Project Title: EUROPOLIS: Development of an integrated control and communication system applicable to urban and road traffic in the next century and capable of allowing entirely automatic and/or manual driving of vehicles equipped with minicomputers.

Manufacturers Involved: CGA (CGE-FRANCE Group); ICSA-IDS (SP); Medio Print (DK).

Cost: 878 MF (French share: 263 MF).

Duration: 6 years (including a 1-year design phase--20 MF in France).

Project Title: OXODIPINE: Development and production of new calcium antagonists for treatment of cardiovascular diseases.

Manufacturers Involved: SESIF (FR); IQB (SP).

Cost: 40 MF (French share: 2 MF).

Duration: 7 years.

Project Title: Automotive Sensors: Installation of a mass production assembly line for silicon sensors for the automobile, automated manufacturing, and safety sectors.

Manufacturers Involved: METRAVIB (FR); CSEM (SWI).

Cost: 92 MF (French share: 48.75 MF).

Duration: 5 years.

Project Title: Multi Media System (MOSES): Development and manufacturing of high performance multimedia systems capable of processing structured data (files) and unstructured data (images, drawings, photographs, voice, etc).

Manufacturers Involved: COPERNIQUE; ICL (GB).

Cost 500 MF (French share: 275 MF).

Duration: 3 years.

Project Title: Local Area Networks (Fieldbus): Development of a range of industrial local area networks with associated VLSI for real time control of processes and machines.

Manufacturers Involved: CGEE ALSTHOM (FR); FOX BORO (GB); VALMET (FI); KROHNE (FRG); CARLO GAVAZZI (I).

Cost: 175 MF (French share: 95 MF).

Duration: 5 years.

Project Title: Procedures for Design and Production of Integrated Circuits: Development, using design and production procedures already installed, of integrated circuit manufacturing units in small lots.

Manufacturers Involved: Thomson Semiconductors (FR); GEC (GB).

Cost: 414 MF (French share: 207 MF).

Duration: 5 years.

Project Title: "Data Base" Machine Adapted to Expert Systems: Management of multimedia relational databases capable of inference, of being sub-divided, and of allowing communication in near-natural languages.

Manufacturers Involved: In-Informatique (FR); ENTEL (SP).

Cost: 159.6 MF (French share: 116 MF).

Duration: 6 years.

Project Title: Software Workshop For Ada Language: Use of available components to provide an ADA programming environment for real-time applications.

Manufacturers Involved: ALSYS S.A. (FR); LOGICA (GB).

Cost: 29 MF (French share: 16.9 MF).

Duration: 2 years.

Project Title: "Hercule" Robot For Construction Purposes: Study and development of load handlers (crane robots) and multitask facade robots (scaffolding, tool carriers).

Manufacturers Involved: Compagnie Generale Des Eaux (FR); Simon (GB).

Cost: 152 MF (French share: 76 MF).

Duration: 5 years.

Project Title: High Definition Television: Introduction in Europe of an HDTV system (production, distribution, servicing), in preparation for MAC CODES standards establishment.

Manufacturers Involved: Thomson (FR); Philips (N); Bosch Fernseh (FRG).

Cost: 1,371 MF (French share: 480 MF).

Duration: 6 years.

Project Title: Fishing Boat for the 1990's: Design and production of industrial fishing boats, high performance, safe, highly computerized, and profitable. Development, at the same time, of single-system acoustic control of all trawling operations.

Manufacturers Involved: IFREMER and ALMA MARINE (FR); INI-DCN and PERCANOVA (SP).

Cost: 330 MF (French share: 132 MF).

Duration: --

Project Title: Vaccination Against Plasmodium Falciparum Blood Forms: Development of a vaccine capable of neutralizing all sporozoites injected into the blood by mosquitoes, to combat mortality in children under 5 years of age.

Manufacturers Involved: Institut Pasteur (FR); BEHRINGWERKE (FRG).

Cost: 90 MF (French share: 30 MF).

Duration: 3 years.

Project Title: Anical Cell Cultures: Cultures of animal cells leading to the production of biological products for immunization and of enzymes and hormones.

Manufacturers Involved: Berti et Cie (FR); Sorin (I); Immuno Ag (A); Pfeife & Langen (FRG).

Cost: 175 MF (French share: 75 MF).

Duration: 3 years.

Project title: Absorption Heat Pumps (PACA): Development of absorption heat pumps and heat transformers for industrial and high power applications.

Manufacturers Involved: Gaz de France (FR); GEA (FRG).

Cost: 58 MF (French share: 32.8 MF).

Duration: 5 years.

Project Title: Surveillance Robots (MITHRA): Development of devices capable of being integrated into systems designed to improve human, real property, and environmental security against both natural and man-made risks.

Manufacturers Involved: Bossard Consultants (FR); Elkron (I); EPFL (SWI).

Cost: 200 MF (French share: 105 MF).

Duration: 5 years.

Project Title: Diesel Compressor for Industrial Turbines: Development of an advanced system for energy production combining the thermodynamic cycles of a highly overfed diesel engine and an industrial gas turbine (3 to 30 MW).

Manufacturers Involved: Stabine (FR); Cockerill Mechanical Industries (B).

Cost: 107.6 MF (French share: 59 MF).

Duration: 5 years.

8615/12851
CSO: 3698/M005

EC SETS GUIDELINES FOR 1987 to 1991 TECHNOLOGICAL R&D PROGRAM

Legal Workings of Program

Brussels GUIDELINES FOR A NEW COMMUNITY FRAMEWORK PROGRAMME OF TECHNOLOGICAL RESEARCH AND DEVELOPMENT 1987-1991 17 Mar 86 pp 1-29

[Excerpts]

SUMMARY

1. A new deal for Europe

Europe accepts the challenge.

In a world characterized by the acceleration of the process of innovation, the global application of production techniques, the development of services and, lastly, the expansion of defence programmes and the importance attached to space in national technological development, Europe is beginning to organize. The year 1985 saw the launching of the Technology Community, the EUREKA initiative and the formal confirmation, in the European Single Act, of technological R&D activities.

Today, the Commission is presenting its guidelines for a new Framework Programme of technological research and development during the period 1987-91.

1. Selection criteria

To ensure that the specific projects and programmes selected do in fact offer that Community added value (which distinguishes them from projects suitable for implementation at regional or national level or within other international or multilateral organizations), the Commission considers the choice must be based on a number of precise criteria:

- research on a scale such that the individual Member States could not, or could only with difficulty, provide the necessary facilities on their own;

- research which has obvious advantages in the way of greater efficiency and lower costs resulting from the sharing of work and the mobilization of adequate human and financial resources,

- research which, because of the complementary nature of the work being done nationally and the scale of the problems involved, especially from the geographical viewpoint, enables significant results to be obtained for the Community as a whole;

- research which provides a favourable environment for international exchange and creativity;

- research which, either because of the scale of its financial allocation or because of its incentive and stimulating effect, attains the necessary "critical size" in relation to existing or future national or multilateral activities;

- research which contributes to the implementation of Community policies including, in particular, the completion of the large-scale market.

These six basic criteria often overlap or complement each other and in any case are never mutually exclusive.

3. Financial balance

3.1. For each activity, a range of financial estimates is given in the table in Annex I. These ranges correspond to different levels of emphasis as regards implementation of the objectives outlined. Different combinations of these estimates, according to the relative priority attached to the individual activities, add up to the total amount that the Commission is contemplating at this stage, namely 9 000 million ECU at current prices for the five years of the Framework Programme. This amount is supplemented by a reserve representing some 15% of the above-mentioned figure, thus producing a grand total of 10 350 million ECU.

The reserve is intended to cover the financing of activities which, in view of developments in the political, scientific and technological situation, the Commission might be prompted to propose but cannot identify at this stage.

The Commission is aware of the need to increase expenditure on technological R&D gradually; this requirement will be taken into account in outlining the changes in commitment and payment appropriations for the period 1987-91.

3.2. A direct comparison of the major amounts and the financial balance thus outlined for 1987-91 with those of the preceding Framework Programme is hardly possible given the different approach adopted with regard to the very structure of the Programme. Under the 1984-87 Framework Programme, the financial balance related to the objectives to the attainment of which the R, D&D actions contributed, in accordance with varying proposals. Thus, the programme on non-nuclear forms of energy contributed to the attainment of the objectives "Improvement of the management of energy resources" (74 %) and "Promotion of industrial

competitiveness" (16 %) and, to a lesser extent (less than 5 %), of other objectives under the first Framework Programme. Under the new structure, financial balance is direcly related to actions covering one or several R&D programmes. Nevertheless, the following table provides a very broad outline of changes in the relative priority of the different topics on which the Coimmunity's action is based.

Topics December 1985	Position in 1982	1984-87 Framework Programme	Execution of 84-87 Framework Programme in December 1985	1987-91 Framework Programme
- Agricultural and fisheries resources, raw materials	3.3%	5.6%	2.6%	2.0%
- Energy	65.4%	47.2%	47.3%	21.0%
- Industrial competitiveness	16.9%	28.2%	35.7%	60.0%
- Quality of life	9.7%	10.3%	10.5%	7.5%
- S/T for development	0.7%	4.0%	1.7%	1.5%
- Europe's S/T potential	0.0%	2.3%	1.6%	5.0%
- General support for S/T development	4.0%	2.4%	0.6%	3.0%
	100 %	100 %	100 %	100 %

V. Implementation of the Science and Technology Community

1. General framework

The European Single Act provides a new political and legal basis for the development of the Community's scientific and technical strategy.

The Single Act fixes the strengthening of the scientific and technological bases of European industry and the promotion of the development of its international competitiveness as Community objectives.

Community activity in the field of technological R&D is to be conducted in a series of programmes at three levels, namely :

- a unanimously approved multiannual Framework Programme, which will provide the basis for the balanced overall development of Community actions;

- specific programmes adopted by a qualified majority, which are concerned with particular objectives, designed to promote cooperation between all the partners (enterprises, research centres) and open to participation by non-member countries;

- supplementary programmes in which only certain Member States will participate.

Pending ratification of the Single Act by the Member States, the Commission's proposal concerning the 1987-1991 Framework Programme is based on Article 235 of the EEC Treaty and Article 7 of the Euratom Treaty.

The specific programmes which are the responsibility of the Community will be adopted in accordance with the procedures laid down by the European Single Act; the Council, acting by a qualified majority, will take a decision on a proposal submitted by the Commission in association with the Parliament; the specific programmes which are the responsibility of Euratom will be adopted in accordance with an identical procedure except that, in this case, Parliament will merely be consulted.

All research, development and demonstration activities will be presented or referred to in the Framework Programme. Nevertheless, the text of the decision to be adopted unanimously by the Council will not mention :

- specific programmes under the ECSC Treaty, which are covered by a Commission decision;

- demonstration projects in the field of energy, since these are intended to demonstrate the economic value of products or processes developed downstream of technological R&D actions, and thus extend the Community's research activity.

2. Preparatory, implementation, financing and evaluation arrangements

Even in preparing the Framework Programme, and in addition to its basic consultation of Parliament, the Economic and Social Committee and CREST, the Commission intends to refer repeatedly to the various consultative committees attached to it (CST, CODEST, IRDAC, ESPRIT Committee, etc.).

These Committees are made up of representatives of scientific and technical circles, industry, the trade unions, consumer associations and the like; the Commission considers that the involvement of all the interested "participants" is essential for the definition of the Community science and technology strategy best adapted to the requirements and aspirations voiced.

A. Existing implementation arrangements - Role of the JRC

In order to implement the actions adopted in the Framework Programme, the Commission intends not only to use the full range of existing arrangements but also to specify a number of new procedures, which the European Single Act in particular makes available to it.

As regards procedures currently in use (direct action, shared-cost projects, concerted action, demonstration projects), the attached table shows the preferred approach to be taken in respect of the procedures proposed for each action.

The shared-cost procedure is obviously the one used in most cases; it makes possible an optimal use of the limited resources available to Europe by combining the resources of industry or national research institutes and those of the Community.

Direct action calls for some comment upon the future role of the JRC. For the implementation of the Framework Programme, the Commission will call on the JRC to undertake the activities most suited to this procedure. The Commission is currently preparing the new JRC programme for the period 1987-91 on the basis of the existing general guidelines for the Framework Programme; together with this new programme, it will submit a document entitled "Guidelines for the Future Development of the JRC". These guidelines derive from the overall evaluation recently carried out by the JRC Scientific Council.

It is clear that JRC's vocation is found essentially in the establishment of norms and standards, that is, the development of the scientific knowledge and techniques necessary to permit regulatory authorities to fix norms and standards on a solid and neutral basis; this being an important element in achieving the internal market. The vocation of the JRC is equally tied to research on industrial safety and the protection of the environment, fields in which the JRC has a special role closely related to acquired competence and to existing experimental installations.

Present research carried out in the JRC already comprises a number of projects which are a good fit with its vocation but which should be further developed in the future programme. As compared to the present situation it is planned to enlarge programmes falling within Community actions relating to the "competitiveness of industry and of services" and to the "quality of life". In contrast, the JRC effort on "energy management" should be reduced. These changes represent a significant step forward in comparison with the present programme. The evaluation report recently issued by the Scientific Council indicates that the JRC is capable of responding to these changes.

To attain the desired end, the JRC must be suitably integrated within the framework of Community research. Still basing itself on the conclusions of the evaluation report, the Commission has the intention on the one hand, of taking measures to ensure better integration between various means of research and, on the other, of guaranteeing better contact between the JRC, industrial circles and national research organizations. It also plans to increase the mobility of JRC research staff as well as to make the necessary arrangements to increase the number of visiting scientists and research fellows coming from the Community.

B. New Arrangements

In addition to applying management procedures and financing arrangements which already exist, the Commission wishes to make use of a set of new methods which are both more flexible and better adapted to the new range of proposed actions. New procedures are already planned or are under study in the Commission's departments.

In this connection, reference can be made to the new arrangements which could be implemented quickly:

1. Joint undertakings: here it is a matter of extending (with or without the participation of the Community, of all or some of the Member States, and possibly of non-Member States), the system laid down in the EAEC and EEC Treaties, after amendment and simplifications.

2. Supplementary programmes: programmes of this type - such as those which have existed or which still exist in the EURATOM framework - can from now on be developed on the basis of the EEC Treaty. These programmes, with or without a contribution from the Community budget, would be defined and carried out only by the Member States concerned and financed by national funds.

3. Minority participation by the Community in national and multinational actions or projects. With this arrangement it would be possible to involve the Community in actions or projects of Community interest in exchange for a degree of financial support.

4. Community budgetary intervention will be supplemented by a number of facilities deriving from new Commission initiatives in respect of financial instruments or techniques, particularly in the case of technological R&D programmes for industrial-scale application which are close to the market, such as the EUREKA projects.

5. Lastly, still with a view to ensuring the same complementarity in relation to existing arrangements, the Commission is prepared to examine the possibility of creating flexible structures of the "agency" type which can provide an interface between Community priorities and policies and the special requirements of operators.

C. Evaluation of results

To complete this set of arrangements, the Commission intends finally to reinforce the system for evaluating its research programmes and their results in the light of the experience gained over several years.

In particular, evaluation by independent experts which has already been applied in respect of numerous Community activities (JRC, programmes on renewable sources of energy, the ESPRIT mid-term review, etc.) will be conducted systematically and periodically for all R&D programmes.

3. Accompanying measures

In order to support the implementation of R, D&D programmes it will, moreover, be possible to make use of a range of accompanying measures. By way of example, reference can already be made to the following :

- all of the initiatives appropriate to the organization of the large market (standards, free movement of goods and capital, tax harmonization). In particular, the Commission will endeavour to facilitate inter-industrial R&D agreements and the exploitation of their results within the framework of its competition policy. In applying Community competition rules, the Commission will accord favourable treatment to state aid for technological R&D.
- The implementation of specific activities of particular interest to those states or regions of the Community whose scientific and technical development calls for special efforts.
  As pointed out earlier, a balanced development of all the Member States and regions of the Community will essentially depend on the translation of the Framework Programme into a set of approriate specific programmes.

  In addition, the use of the ERDF and the IMPs for certain infrastructure projects can be considered together with the creation of new financial arrangements which could support infrastructure projects and at the same time meet the needs of small and medium-sized firms.

  Furthermore, other proposals have already been submitted by the Commission, such as the programme relating to the development of certain less-favoured regions of the Community for improved access to the advanced telecommunications service (STAR Programme, COM/85/836 final). In the framework of shared-cost R&D programmes the Commission's departments are studying ways and means of systematically linking laboratories or firms in less-favoured regions to R&D institutions in those Community countries which are most advanced in science and technology, in fields in which this type of association facilitates valuable cross-fertile cooperation.

- the implementation of measures concerning small and medium-sized undertakings with a view to involving them in the progress of the Community and allowing them to exploit the Community's large-scale market potential to the full.

  The Science and Technology Community must take account of the fact that the advanced industrial economies are going through a period of intense technological change, during which small and medium-sized businesses are frequently best suited to the adoption of innovatory policies and the maintenance of a high degree of competitiveness based on innovation. These businesses can guarantee Europe's place in the new international division of labour and the competitive dissemination of its technology. Consequently, the Community will seek to create a suitable environment for the development of a network of healthy, dynamic and innovatory small and medium-sized European businesses. The Commission will shortly send the Council a communication specifically concerned with this type of action.

- finally, increased support for the training and retraining of research workers. It should be mentioned here that in the Framework Programme of Community scientific and technical activities only initiatives favouring postgraduate research workers and scientists will be considered. These activities therefore go beyond the scope of the COMETT programme (Community Programme for Education and Training in Technology), which is essentially concerned with the further training of student, teachers, engineers and technicians with regard to changes in the new technologies and thus constitutes a necessary complement to the actions planned under the technological R&D Framework Programme.

4. An open, confident Technology Community

The reinforcement of Community action in the field of technological R&D certainly does not represent an isolationist withdrawal behind its geographical and institutional frontiers on the scientific and technical level. On the contrary, it must be accompanied by increased international cooperation, especially in a field such as thermonuclear fusion and more particularly at European level.

- The close links established with the European Science Foundation, the European Space Agency, CERN and the Council of Europe must be maintained and, where appropriate, strengthened, in particular by the execution of joint projects.

- Bilateral cooperation with the EFTA countries will acquire a new dimension with the implementation of the framework agreements on scientific and technical cooperation which have already been, or which are due to be, signed. These countries, which are already involved in a number of Community programmes both under the Euratom (fusion, radioactive waste) and EEC (environment, raw materials) Treaties should in further cooperate more closely with the Community in several sectors, such as telecommunications, information technology, manufacturing techniques and materials.

- Lastly, in preparing the new Framework Programme, particular attention must be paid to existing links with two multilateral cooperation initiatives, namely the extremely new EUREKA programme and the much [word indistinct] COST. At the present stage of planning, the following links between the Community action and these two initiatives can be outlined.

EUREKA

The EUREKA initiative is the expression of the wish of the Government's of eighteen European states and the Commission to implement a policy centring on the joint confrontation of the challenges posed by the development of new technologies and their incorporation in the industrial innovation process.

Twenty-six cooperation projects involving industries from several states and, in many cases, the Community have been launched since the declaration of principle defining, in particular, the goals and implementing conditions of this initiative was adopted by the European Ministers of Foreign Affairs and of Research in Hanover on 5-6 November 1985, following the launching of the initiative at the European Technology meeting in Paris on 17 July 1985 in response to the initial discussion at the Milan European Council on 28-29 June 1985.

The declaration points out these "EUREKA projects are not intended to replace existing technological cooperation in Europe - such as the programmes of the European Communities - nor its subsequent development. On the contrary, their purpose is to extend or supplement this cooperation".

Whilst the Community will continue to develop scientific and technological programmes on the basis of objectives, criteria and priorities defined jointly with the Governments and industries of the Member States, EUREKA projects will essentially be implemented on the initiative of individual enterprises seeking to cooperate. These enterprises will be responsible for project management including, in most cases, financing. The projects will mainly relate to the joint development of advanced techniques close to the market or of infrastructures of transnational interest.

The Commission has supported this initiative from the start, considering that, if conducted in a consistent and symbiotic manner, the Community programmes, together with their resultant projects and the EUREKA projects, can, by virtue of their complementarity, constitute a whole which will make possible the attainment of the common objectives of these two categories of action, namely the increased productivity and competitiveness of European national industries and economies on the world market and a resultant contribution to greater prosperity, and higher levels of employment.

In this connection, it should be emphasized that the general budget of the European Communities for 1986 contains a new Chapter 78 on "Expenditure arising from the participation of the European Communities in Scientific and Technological Prospects of Community Interest - EUREKA and others".

The Commission believes that the Community must make a variety of contributions to EUREKA to enable the full potential of this initiative to be realized. These include :

- the immediate and direct involvement of its experts in the preparation of the procedures now under discussion concerning the execution of the project, and its agreement in principle to second qualified staff to the EUREKA secretariat.

It will also be necessary to provide access in conjunction with Ireland, to the EUROKOM information communication system developed within the framework of ESPRIT.

- participation in the organization of industrial seminars such as that on gallium arsenide and biotechnology.

- direct Community participation in certain EUREKA projects of recognized Community interest.

- Community cooperation in EUREKA projects representing a direct extension of activities conducted within the framework of Community projects (e.g. projects on amorphous silicon, software portability, membranes, the environment and research networks).

- the Community's contribution to the success of research cooperation through the creation of a large internal market which will provide the optimum conditions for the economic exploitation both of Community programmes and of EUREKA projects.

- lastly, the creation in the future of the abovementioned flexible institutional and financial frameworks suitable for EUREKA projects whose implementation would be in the Community interest.

Links with COST

The Commission has repeatedly stressed the importance that it attaches to furthering cooperation within COST. This form of cooperation had its beginnings in 1971 and it has enabled a wide range of activities to take place in different scientific and technical sectors by combining the advantages of a flexible procedure, of variable association between States - depending on their specific interests - and of participation by non Member States in the scientific and technical activities of a wider Europe.

Since COST was created, its background has of course altered profoundly. The expansion of the Community from six to twelve States, the diversification of the range of Community R&D programmes, the opening of those programmes to more and more non-Member countries, the strengthening of the bonds between the EFTA and Community countries as a result, in particular, of the Luxembourg Declaration of April 1984, and the launching in 1985 of the EUREKA initiative are all factors which cannot be disregarded when examining the future of COST.

There must be provision in future for a symbiosis between Community programmes, COST and EUREKA projects. As one of the avenues of activity open to Europe, COST seems particularly suited to:

- highly specific activities which are limited in time and are not well adapted to inclusion in the Community's major long-term programmes and which, moreover, while adopting the EUREKA "bottom-up" approach, are unable by their very nature to share EUREKA's background owing, for example, to their distance from the market.

activities in areas inadequately covered, if at all, by Community programmes, such as transport or aquaculture.

The Commission will pursue its dialogue with the Member States and the other COST States on the direction in which to steer COST in future. It must be accorded considerable importance when the new Framework Programme is put into effect.

VI. Conclusions

The initial responses - whether informal or not - of all of the advisory bodies consulted (CREST, CODEST, IRDAC, CGC, ESPRIT Committee, ...) have confirmed the Commission's conviction that the creation of a European science and technology community is both necessary and feasible.

A great effort by all the participants (public institutions engaged in R&D, large-scale enterprises, small and medium-sized businesses and national and Community bodies capable of contributing to the attainment of this objective) is thus called for.

Among this vast array of activities to be conducted and initiatives to be launched, it will be necessary in the coming months to define the action to be taken by the Community, that is that part of the undertaking to be conducted jointly.

The vehicle for this undertaking must be the "1987-91 Outline programme of Community scientific and technological activities" forming the basis of Europe's scientific and technical strategy.

That is why, before preparing a formal proposal for an outline programme, the Commission hopes to draw upon this document, which does not constitute its formal proposal or prejudge its contents,and its annexes in discussing the following with the Community institutions:

- the general S/T lines to be followed,
- the priorities and balances to be respected,
- funding and the gradual "increase in power" to be provided for in terms both of commitments and of payments.

The Commission will draw up its formal proposal as regards scientific and budgetary aspects, in the light of these discussions and the conclusions drawn and will send it to the Council and to Parliament in July 1986.

SUMMARY LIST OF COMMUNITY ACTIONS	Range in * MioECUs
1. Management of Resources	
1.1. Agricultural and Fisheries Resources	90- 180
1.2. Raw Materials	60- 90
2. Management of Energy	
2.1. Fusion	1060-1200
2.2. Nuclear Fission	600- 700
2.3. Fossil, New and Renewable Energy Sources and Rational Use of Energy	250- 350
3. Competitiveness of Industry and Services	
3.1. Information Technologies	2200
3.2. Telecommunications Technologies	1000
3.3. Integration of Information and Telecommunications Technologies into New Applications and Services of Common Interest	700- 900
3.4. Cooperation on Basic Research in Information Technologies *	40- 50
3.5. Technologies for Manufacturing Industry and Special Technologies	600- 900
3.6. Biotechnologies, Agro-Industrial Technologies	350- 460
3.7. Materials Science and Technology	200- 300
3.8. Marine Science and Technology *	pm**
3.9. Transport *	50- 80***
3.10. Scientific Norms, Reference Materials and Methods	300- 350
4. Quality of Life	
4.1. Health	140- 160
4.2. Safety	230- 280
4.3. Environmental Protection	285- 320
5. Science and Technology for Development	100- 200
6. Europe's Scientific and Technical Potential - the Researchers' Europe	400- 500
7. General Support for Scientific and Technical Development	
7.1. Innovation	80- 150
7.2. Communication and Information Network and Scientific Data Bases	20
7.3. Linguistic Problems	80- 100
7.4. Forecasting, Evaluation and Statistical Tools	30- 35
7.5. International Cooperation	50- 60
Supplementary programmes (outside own resources) identified to date : HFR	100

FOOTNOTES

* in July 1986, the Commission will submit a formal proposal, as regards the scientific and financial aspects, in the light of its discussions with the community institutions.
** the sum subsequently decided upon will be taken from the reserve
*** does not include a possible action in the field of aeronautics which would be funded from the reserve

Background on Specific Programs

Brussels GUIDELINES FOR A NEW COMMUNITY FRAMEWORK PROGRAMME OF TECHNOLOGICAL RESEARCH AND DEVELOPMENT 1987-1991 17 Mar 86 pp 3.1-1-7.2-2

[Excerpts]

3.1 Information Technologies

a. This action covers the ESPRIT programme the objectives of which are to take advantage of the Community dimension :

- to enhance the technology base in IT on the precompetitive level, enlarging scope and applying economics of scale, in order to meet successfully the requirements of the world market in the nineties
- to improve the use of scientific and industrial R&D capabilities by cooperative efforts,
- to pave the way to widely accepted international IT standards, and
- to promote the transfer of technology in the IT sector with particular emphasis on needs of SME's.

b. The programme has just been reviewed by an independent high level body (ESPRIT Review Board). The results of this review, which demonstrate that ESPRIT has been successfully established and is well on its way to meeting its objectives, has been transmitted to the Council and the Parliament (COM(85)616 final). Moreover, the yearly workprogramme of ESPRIT is a unique characteristic, ensuring that the programme is under constant assessment.

In accordance with the recommendations of the ESPRIT Review Board, and as a result of an extensive conslutation process with industrial experts a consensus view on the scope and content of the programme from 1987 onwards is emerging along the following axes:

1. Microelectronics and peripheral technologies

- Silicon technology. Silicon technology represents the foundation of the IC industry and silicon-based devices are responsible for the dramatic reduction in the cost of electronic equipment that has occurred in the past years and will continue in the future. Specific technological targets would be eg. 4 million transistors on a chip using 0.5 micron technologies and 3D-integration.

- Compound semiconductors. The use of compound semiconductors for high-speed circuits is expected to become increasingly relevant in future computer and telecommunication systems as well as in other applications. Europe has the potential opportunity to become a significant supplier of compound semiconductor devices. To ensure a sufficient European capability in this area, a significant increase of the current R&D level is required.

- Computer aided design (CAD). The availability of CAD for very large scale integration for the overall success of the efforts in microelectronics continues to be a crucial factor. Future CAD projects will take advantage of the results achieved so far in ESPRIT and will in particular focus on very high performance systems, testing aspects as well as standardisation aspects.

- Peripherals. Peripherals represent an ever increasing proportion of the total cost of IT systems. A major technology push in response to future market demands requires, in particular, substantial R&D efforts in magnetic, optical and magneto-optical storage, printers, sensors and displays.

2. Information processing systems

- Systems design and architectures. The overall aim is to ensure that IT industry has the necessary facilities to produce high quality systems, quickly and economically. Systems, of similar complexity of those being developed in 1985, should within 10 years be developed with 10% of the resources required to develop the systems today. Furthermore, novel architectures for IT systems will be developed and analysed with respect to their reliability and performance.

- Knowledge engineering. The use of knowledge based systems is expected to provide a qualitative jump in future applications of IT. The level of cooperative generic research in this area needs to be maintained in order to successfully meet the competitive requirements in the nineties.

- Signal processing. The ability to process speech and complex images, are expected to be important new characteristics of future IT systems. Accordingly R&D in this area will be on continuous speech recognition with large vocabulary, and advanced image processing systems.

3. Integration of IT into application systems

- IT support systems. This area is concerned with the basic IT technologies relevant to the office, production, other professional applications and the home sector. It includes eg. R&D on workstations, I/O subsystems for broad spectrum applications, man-machine interfaces and interfaces with the physical environment. Its potential impact on medium-term market requirements is expected to be particularly relevant.

- Factory automation. IT applications in production environments are of utmost importance to European economy. Key target is to establish open systems architectures, promote CAD/CAM systems and shop floor control systems. The level of R&D in this area needs to be considerably increased.

- Integrated IT systems comprise technology integration projects building upon different technologies, and oriented towards selected applications.

4. Measures with respect to the dissemination of the results of R&D projects play an increasing role in the further progress of the action.

5. A broad-scale participation of SME's to the action is considered to be vital in order to maintain and stimulate its innovative character, which is a prerequisite to meet its overall objectives.

c. Expected results :

- enable the European information technology industry to successfully meet the competitive requirements of the world market in the nineties,
- diffusion of these technologies through different sectors of our economy leading to product, process and service innovations.

d. Motivation for EC action :

- pooling of resources and worksharing is necessary to compete with the massive public programmes in the US and Japan,
- coordinated approach is also necessary to develop common standards and to encourage industrial cooperation in Europe.

e. Industry representatives currently estimate the overall efforts necessary to carry out the above described work to 30000 manyears to be invested progressively from 1987 onwards. These estimates need to be consolidated in the forthcoming months. These efforts would correspond to approximately 2200 MioECUs Community contribution.

3.2 Telecommunications Technologies

a. For the competitiveness of European economies the price-performance of telecommunications services plays a decisive role in the emerging global market-place. In order to maintain a strong position and lead in the transition towards fully digital operation Europe will need to invest in a timely manner in the advanced telecommunication technologies and make optimal use of its resources.

The EC telematics industry and Telecommunications Operators Research Establishments have, in 1984, established a broad based consensus on the objective :

Community-Wide Introduction of Integrated Broadband Communication (IBC) by 1995 taking into account the evolving Integrated Services Digital Networks (ISDN)

and worked out common requirements for :

R&D in Advanced Communications-technologies in Europe (RACE)

which aims at establishing the technology base for progressive introduction of Community IBC infrastructure and services.

RACE distinguishes several phases or stages of commitments which correspond to progressively improved definition of the objectives and requirements. Specifically:

Definition phase (decided in 1985), to execute initial work as required to focus the main programme R&D accurately on future functional requirements of the network, the terminal area and future applications, and the evaluation of key technology options.

Phase I (1987-1991) will have the objectives:

- the technology base for IBC,
- the precompetitive developments necessary for the provision of trial equipments and services for IBC demonstration,
- support for the work of CEPT and CCITT in the formulation of common proposals for specifications and standards.

Phase II (1991-1996), depending on the outcome of phase I, would have the overall objectives of developing the technology base for enhanced IBC equipments and services beyond 1995.

b. Scope (Phase I) :

1. Specific system aspects

Part 1 addresses the system engineering aspect of IBC and will explore systems architecture, subscriber environments, network sub-systems, operations and maintenance related issues. In doing so, it will take into account ISDN and alternative carrier concepts and mixes.

The work addresses three closely related but distinct aims:

- exploration and identification of IBC systems evolution,

- identification and specification of functional requirements serving as objectives for the R&D on the sub-systems and basic technology levels, and

- specification of the verification and testing required before full scale development is considered i.e. the definition of the requirements for demonstration and trials.

2. Research into the requirements of the users and service providers

The understanding of the user and service provider Requirements is a key condition for the conception and design of future infrastructure and services. Some requirements can be assessed on the basis of past experience with sufficient accuracy to serve as an orientation for the technical development. However, new services and operational concepts for users and service providers require careful research. This is in its own right a significant multidisciplinary R&D effort.

Past experience with the introduction of new communication services clearly demonstrates the risks of separating technical from market, application and user oriented research. Accordingly part 2 has been designed to address the link between the users and the service providers on the one hand, and the developing technology options on the other.

3. Enabling and supporting technologies

This part addresses the three main families of technologies on which the successive generations of IBC implementation will build:

- electronic components used for communications,
- optics and optoelectronics, and
- design tools for communication systems.

The aim of the R&D in these domains will be to advance the performance characteristics for their applications in telecommunications, i.e.

- performance in terms of bandwidth and complexity,
- system compatibility, i.e. aptness to standardisation, and
- live-cycle costs, including quality, reliability and maintenance.

Although the main thrust of part 3 is at the basic technology level, some sub-system considerations are implicitly included since some components (e.g. microprocessors) represent in terms of complexity, sub-systems in themselves.

4. Dedicated communication software

This part addresses the software R&D issues which are particular to the application in telecommunications. It is assumed that progress in software technology aimed at in national programmes and ESPRIT are realised and that the work in RACE can benefit from it.

A considerable effort will be required to develop adequate tools that will meet simultaneously the operational and managerial specifications of telecommunications. This applies particularly to IBC which will require a very large, complex, and functionally rich, software implementation.

5. Terminal technologies

Having a powerful and low-cost IBC technology is an essential pre-requisite for the introduction of broadband services, but insufficient unless parallel major progress is made in improving the cost-performance of terminal technology.

IBC aims ultimately at serving the public at large, i.e. cannot be seen just under the aspect of specialised services for the business community which may be prepared to pay comparatively high system costs. For IBC to achieve high penetration rates and wide acceptance, costs have to be very much reduced.

Terminal equipment with the right characteristics enabling easy and friendly use and the right cost-performance will require major technological advances and prolonged efforts of a considerable scale. This kind of technology cannot be expected to derive automatically from business applications.

Part 5 defines the R&D which promises to offer adequate performance for the use by the general public at sufficiently low cost levels.

c. The thrust of RACE would be to establish on the world market a strong, if not leading, position of the Community telecommunications manufacturing and service industries in broadband communications and accelerate the emergence of a strong and competitive Community market for telecommunication equipment and services. The phase I will result in a common technology base and contribute to the convergence in technical and functional specifications, which is of decisive importance for the emergence of a Community-sized market for broadband infrastructures, equipments and services.

d. The objective of providing Europe's economies in the 1990s with telecommunications services leading in cost-performance can only be realised by making full use of Europe's integral assets in technology, industrial capacities, human resources, markets and finance. A concerted approach offers advantages of scale and scope comparable to those available to Europe's main competitors. The investments

associated with developments are so high that it goes largely beyond what operators and industry can invest on the economies national markets can offer.

The RACE programme which will be carried out with the participation of all Member States, will be instrumental in harnessing Europe's considerable technological expertise in areas such as optoelectronics, advanced semiconductors and software for multi-service broadband telecommunications systems. This will service business needs on a community scale for low-cost, reliable and secure data, voice and image communication as well as providing a wide variety of communications and entertainment services for private users.

e. In 1984 a planning exercise has been carried out by the telecommnication industry and operators, which identified the pre-competitive effort offering significant advantage of Community scale. This planning exercise led to an approcimate level of 14.000 man-years for five years. The Council of Ministers decided in July 1985 a definition phase, which will define the scale and scope of the effort to be engaged in the main phase. On this basis and supposing a 50% Community financing, this evalution leads to an estimation of 1000 MioECUs.

The Council of Ministers decided in July 1985 an 18 months definition phase, which will further define scale and scope of the efforts to be engaged under this action.

3.3. Integration of Information and Telecommunications Technologies into New Applications and Services of Common Interest

Progress in information technologies and telecommunications (IT&T) is rapidly transforming the socio-economic conditions and the basis of the world economy. This offers new opportunities to solve present and future societal problems in all spheres of life. The benefits of this change will depend on mastering these technologies and their conscious application and choice governed by societal needs and aspirations. The successful exploitation of these new possibilities requires a well considered and systematic approach involving the respective main actors since in most cases traditional sectors undergo in this context profound transformations.

Besides the direct application of IT&T the systems-integration with other technologies, leading to new applications and services, opens up a most important potential for the future, both in terms of economic opportunities and of contribution to societal objectives in Europe.

A. The systems-integration of IT&T with

- learning and teaching permits the realisation of advanced open learning concepts which will not only provide the educational community with enhanced tools but also remove constraints in access to learning (DELTA);

- road-safety and mobile communication offers powerful means to reduce traffic accidents, improve traffic management and thereby transport economics (DRIVE);

- bioinformatics and medical informatics can be developed to considerably further improve research, diagnostics and health care (BICEPS);

- laboratory technology offers major improvement in the productivity of research, development and experimentation (PERT);

- financial technology offers advances towards the realisation of Community-wide financial services, markets and a reduction of crime (DIME).

Background and method of elaboration of the actions:

The identification of these actions has resulted from the consultation of the respective actors and have been indicated in the COM(85) 350 and COM(85) 530 "Technological Europe" as areas where the Commission is developing action proposals. Some of their objectives have been confirmed in the framework of IRIS as corresponding also to the socio.political perception of Community priorities.

The method of elaboration for these actions follows a consistent sequence of steps:

1) an initial in-house analysis of the importance and the likely "value-added" of a Community approach resulting in the identification of overall objectives and lines of action;

2) exploratory investigation and definition of the detailed objectives and the optimal approach to an effective use of the overall Community resources with the respective main actors;

3) preparation of proposals for concerted actions embedding the Community measures in the context of national and international activities;

4) launching of a definition phase serving the systematic development of the action by the respective main actors;

5) implementation including periodic reviews and assessments of developments which might require adjustment of objectives and approach;

6) on-going critical evaluation and adjustment in the light of the experiences gathered in the implementation.

The first step is guided by the priorities of the Community and the political orientation of Council and Parliament as it translates for the domain of IT&T.

During the second step each action is subject of systematic investigations drawing on external expertise as well. The best qualified organisations are identified in an open bidding procedure in the Official Journal.

Step three is referred to as "planning exercise", it consists of a systematic involvement of the main actors in developing the action proposals.

The definition phase represents the last step before the implementation of an action. It consists of initial work as may be required to verify the objectives, approach and assessment of the requirements to realise them.

With the implementation the task of evaluating is taken up which extends both to external changes, i.e. requirements, state-of-the-art, etc. as well as progress of the projects making up the action. In yearly intervals the workprogramme and resource allocation is systematically re-examined.

At a suitable stage of the implementation, an independent review aids the Council and Parliament to assess the action in the light of its objectives.

For each of the subjects described below it is indicated which stage has been reached.

B. Other actions aiming more specifically to societal objectives will be identified in the coming months according to the orientations given by the Research Council of December 1985 in its debate on IRIS. In this context, preliminary studies will be launched to explore Community initiatives in priority areas dealing with objectives such as :

- better health;
- safer life;
- domestic and home applications;
- improvement of services and facilities for people living in rural areas.

* *
*

The estimates of the resources derive from the detailed workplans; therefore it is at this preliminary stage not possible to provide reliable figures. Still based on initial assessments one could envisage Community contributions situated between 700 and 900 MioECUs.

DRIVE (Dedicated Road Safety Systems and Intelligent Vehicles in Europe)

a. Each year 55.000 people are killed and 1.8 million people injured on roads in the Community. The overall societal costs of these accidents is very high and it has been estimated that 3.2 billion ECU a year could be saved by applying information and telecommunication technologies to avoid car collisions.

Moreover, the indirect effects of road safety on the quality of life and the economy are numerous and of great importance, e.g. on the congestion of roads.

Recent advances in IT&T are progressively opening up new and much more cost-effective ways of improving road-safety and transport management in general.

b. Scope :

DRIVE will contain application-specific R&D&D&T addressing in particular the systems engineering and systems-integration aspects.

1. Accident avoidance system

This area is concerned with the integration of various "safety-related" electronic subsystems into an integrated vehicle control and management system.

2. Vehicle communication systems

In the coming decade mobile telephony will increasingly become standard equipment of vehicles. The infrastructure provided for this service can at the same time support safety and traffic management functions.

3. Traffic management and control

The use of IT&T as part of an integrated application will permit considerable progress to be made in avoiding congestions, navigation in towns, re-routing in case of blockages and the clearing of routes in emergency situations.

c. The Programme DRIVE is to provide the framework in which industry and administrations can Europe-wide develop the technological means to achieve

- a drastic reduction of serious road incidents, and
- economies of scale and scope required for an early development and introduction of these techniques.

d. Improving road-safety is a common objective of all Member States and sharing the burden of developing new means of improving road safety and communications are clearly to the advantage of both the citizens as well as the industries concerned. The way for such a development is prepared in R&D&D&T efforts as to be undertaken in the framework of DRIVE.

e. For 1987 a definition phase is envisaged preparing the main programme foreseen to be implemented in 1988. This will permit a precise formulation of the work offering the greatest advantage of Community scale and being complementary to work carried out on the Member State level.

The resource estimates are to be indicated at a later stage of development of this action.

BICEPS (Bio-Informatics Collaborative European Programme and Strategy)

a. The continuous growth of medical expenditure has become a major issue. In the European Community, the total expenditure for social services has in real terms, increased by 27% since 1975 and its accounts now for more than one quarter of the GDP. Of the total ECU 720 billion expenditure more than 75%, ie ECU 540 billion relate to medical services and care for the aged. As life expectancy grows the demand for further improvements in the quality and cost-effectiveness is also likely to increase.

BICEPS develops IT&T to meet the specific needs of medical services and the use in medical and biotechnological R&D&D&T.

b. Scope :

1. Medical informatics

A further improvement of health care and better economics of providing it will depend on progress in numerous domains. One of the opportunity areas for progress builds on the consequent exploitation of the potential of IT&T. Their application in various functions can ring very significant improvements in quality, availability and cost-effectiveness of medical care.

2. Bio-informatics

A major part of the medical expenses in associated with pharmaceutical products and medical research. In this domain there is strong dependence of progress in biotechnology and medical research with bio-informatics.

Therefore, BICEPS addresses both the medical-informatics and bio-informatics needs.

Links with Community actions ESPRIT, RACE and the BAP exist as well as with actions on the level of Member States.

c. The results of BICEPS are expected to provide for a rapid development of advanced techniques for both the medical services and medical/biotechnological R&D&D&T.

d. ESPRIT is resulting in generic information technology on with specific efforts in bio-informatics can build. The IT-industry is collaborating already on a Community scale. This offers particular opportunities to assemble the expertise and industrial capacities to support the work in this domain. Furthermore, there are considerable advantages in worksharing and cooperating for both the speeding up of development and the gathering of experiences which is crucial for building up the confidence of the medical profession in new techniques.

e. For 1987 a definition phase is envisaged preparing the main programme foreseen to be implemented in 1988. This will permit a precise formulation of the work offering the greatest advantage of Community scale and being complementary to work carried out on the Member State level.

The resource estimates are to be indicated at a later stage of the preparation of this action.

PERT (Professional Electronics and Research Technology)

a. The Community's productivity in R&D and here particularly in high-technology domains is significantly below that achieved in the USA and Japan which have made enormous advances in this respect in recent years based on a consequent use of advanced IT&T.

The objective of PERT is to improve the productivity in Community R&D equal to or better than that of its main competitors.

b. Scope :

1. Information resource management in the laboratory environment

The information resource management is one of the central problems in laboratory work. Advanced techniques using recent progress in IT&T offer the potential of major improvements. However, the laboratory conditions and diverse requirements demand a systematic effort in

developing compatible components and subsystems which can interoperate to meet a wide range of conditions. This represents a major task in systems-R&D, systems engineering and systems-integration.

2. Data capture

Rapid gathering of data and their pre-processing is a key factor in speeding up technological analyses. New techniques using progress in sensoric and IT&T permit the development of more versatile devices for these needs.

3. Information interpretation

Increasingly screening and alternative interpretation of technological data, concepts and conditions require sophisticated tools for interpretation and simulation. While these tools have been developed for engineering purposes their use for designing and interpreting experiments is still in its early stages. PERT is to develop generalised laboratory/scientific tools for these functions. This includes the development of knowledge-based used friendly applications for the interpretation of information.

c. PERT is to result in a significant improvement in the productivity of technological R&D and the provision of high performance tools for accelerating the industrial development processes.

d. Besides being a problem common to all Member States the investment and the specialists in this domain are comparatively limited. A work-sharing and cooperative approach not only improves the chances for each project but because of the systems interdependencies synergy and cross-fertilisation will be important. Within a Community action, defined jointly with the main actors, this can be realised.

e. For 1987 a definition phase is envisaged preparing the main programme foreseen to be implemented in 1988. This will permit a precise formulation of the work offering the greatest advantage of Community scale and being complementary to work carried out on the Member State level.

Resource estimates are to be indicated at a later stage of the preparation of this action.

3.6. Biotechnologies and Agro-Industrial Technologies

3.6.1. Biotechnologies

a. As in the 1984-87 version of the Framework Programme, the recognition of biotechnology as a specific action is motivated by the major impact that the applications of modern biology to agriculture and industry will have on the activities of several traditional economic factors. Some 40% of manufacturing output in a developed economy is biological in nature of origin and numerous advances of fundamental significance (production of new crop plants, synthesis of vaccines, drugs and chemicals with high added value, development of techniques for processing, transformation, extraction, detoxification, ..) are now being made or are expected before the end of the present century.

b. The main reasons for current relative weaknesses of the Community in modern biotechnology have been identified (COM(83)672) and can be attributed to the fragmentation and dispersion of research efforts, a shortage of scientists with advanced training adapted to the requirement of Biotechnology R&D and the absence in the Community of a supportive context for the rapid development of modern biotechnologies. The objectives of the proposed activities are to provide, in the most important areas of biotechnology, a transnational dimension to the isolated efforts carried out in each Member State for :

- encouraging mission-oriented research and the reinforcement of R&D contextual infrastructures in those sectors where important bottlenecks have clearly been identified which cannot be rapidly overcome without the pooling of competences and facilities dispersed throughout the Community;
- organizing these dispersed competences and facilities in a Community training network of exceptional quality from which young scientists in each Member State can fully benefit.

The fields of biotechnology R&D where Community efforts for transnational research and training should be conducted in priority, through cost-shared actions and training contracts, are the following :

- data banks : modelling of biological structures, processes and systems;
- collections of biotic materials;
- enzyme engineering and protein design;
- genetic engineering;
- physiology, genetics and molecular biology of species important for agriculture and industry (area, essential for long term innovations in biotechnology, not covered by the current RAP Biotechnology (1985-89);
- technology of cell and tissue culture in vitro;
- development of in vitro tests for pharmacology and toxicology;

- evaluation of risks associated with modern biotechnology.

- promoting the concertation of the Member States for the effective implementation of the Community action priorities which, in addition to research and training, and concertation itself, comprise : raw materials of agricultural origin, regularoty regimes, intellectual property, demonstration activities.

c. What is proposed above by the Commission is in fact a continuation and amplification of the work carried out in the biomolecular engineering programme (BEP) (April 82 - March 86) and in the RAP Biotechnology (1985-1989). The results obtained in the biomolecular engineering programme and the launching in 1985 of the RAP Biotechnology have demonstrated the possibility and utility of Community research and Community training in biotechnology. Transnational networks of laboratories of high scientific quality have been constituted throughout Europe which undertake joint research for the elimination of important bottlenecks to innovative applications and which provide an array of services and training facilities adapted to the complex requirements of modern biotechnology. It remains, through additional efforts during the period 1987-1991, to intensify the activities of this large multi-disciplinary, polyvalent "institute without walls" distributed throughout the entire territory of the Community and, now that the foundations of a transnational network are firmly established, to stimulate much more actively than in the past, joint partnerships at Community level between universities and industries. A very important task, in this connexion, will be the continuation and amplification of long-term Community research leading to the development of new crop plants adapted to the industrial requirements of the Community and to the promotion of innovative technologies for the exploitation by industries of agricultural feedstocks.

   As far as concertation is concerned, the work initiated in 1985 for assessing the strategic significance of new developments in biotechnology and for promoting the necessary coherence between the various areas of Community policy affecting or affected by biotechnology needs to be continued and amplified, together with the promotion of the concertation necessary between Member State and Community activities in biotechnology.

d. The action includes work to be carried out as cost-shared actions (research), training and concerted actions.

3.7. Materials Science and Technology

a. Advanced materials are already, and will remain for the future, crucial elements in almost all important manufacturing industries. The scientific and technical progress linked with materials will have

a considerable effect on the prosperity of sectors such as motor vehicles, aerospace, shipbuilding, railways, electronics, telematics, building, energy production, biomedical and many others.

This field includes a wide variety of items such as metals, plastics, ceramics, concrete, glass, electronic materials and composites. Equally, the properties to be improved are also numerous : mechanical strength, lightness, stiffness, cheapness, flexibility, electrical and magnetic properties, high or low temperature related properties, etc.

The considerable economic significance of this area is best highlighted by the following figures : the added value generated by the materials industries for all OECD member countries may be estimated at about $ 500 billion and the corresponding number of jobs at 20 million.

It is with advanced materials and their rational use that manufacturing industries will be able to improve the performance of their products and thus make them more competitive. Advanced materials will also contribute to the rational use of raw materials and energy and the control and reduction of pollution.

b. Europe has lost some ground to the United States and Japan. Although there are materials laboratories with a high reputation in Europe, their innovative capacity is in decline. This failure to keep up in the field of advanced materials bears a certain similarity to what has happened in the field of information technologies. Europe's creative spirit is receding and its laboratories are less efficient than their overseas partners. 4 out of 5 patents on materials are applied for by American and Japanese companies and a major part of the high technology materials available in Europe is either produced under license or imported (carbon fibers, special polymers, etc.)

No single Member State can afford the resources necessary to be competitive over the entire spectrum of advanced materials. A Community action is essential to encourage worksharing and pooling of financial and manpower resources on the european scale. Only by reducing duplications and sharing large research facilities and equipments can Europe maintain the pace with its overseas competitors.

Effective use of advanced materials is essential for the success of the products of European Industry. Development of improved materials and development of improved techniques for exploiting materials make complementary contributions to this goal. Although generally distinct, these activities must be carried out in continuous close inter-action. **For this reason the work in the area of materials science and technology and the work in the area of technologies for manufacturing industry (section 3.5) are and will be carried on in close consultation.**

c. The former materials research programme on substitution and technical ceramics was rather small. It was limited to the fundamental aspects of substitution of strategic metals such as chromium, cobalt and tungsten, and the investigation of technical ceramics in regard to ceramic powder preparation and characterization.

A Community action commensurate with the challenges will need to address the following wide range of advanced materials which are promising in terms of improved or new performances, functions and applications.

The effort will cover fundamental research (understanding of properties and phenomena) as well as technological R&D on means of processing, testing, characterising and producing these materials :

- engineering ceramics : powder quality and processing, reliability, brittleness, shaping;

- polymers : in particular investigation of new types of polymers with high thermo-mechanical properties, large stability area, polymer blends, and conducting polymers;

- composite materials and fibres : further development of organic matrix composites and high strength fibres; optimisation of metallic matrix composites with ceramic fibres; special composites with amorpheous, vitreous, or elastic matrices; matrix/fibres interface phenomena;

- advanced metal alloys : light and hard metal alloys, magnetic alloys; powder techniques (rapid solidification), near net shape forming;

- electronic materials science : including special semi-conductors (II/VI, amorphous, organic, etc...) and biomaterials (detailed work to be defined in relation with activities described under items 3.1 and 3.4);

- amorpheous and disordered materials : special materials including glasses, vitreous materials, non crystalline solids, such as amorpheous metallic alloys, prepared by fast quenching.

Other areas which could also be considered at Community level depending on resources available include : superconducting materials, advanced building materials, and biomaterials.

A Community pilot laboratory integrating equipments for advanced materials synthesis and processing research should be set up in the JRC. This ion/laser/electron foundry, would operate as a demonstrator project open to industrial participation and researchers from all Member States.

More specific orientations and the allocation of the Community resources between fundamental research and technological R&D and among

the various material families, materials for specific functional applications, and processes will be defined and reviewed on the basis of economic studies and surveys on new opportunities and industrial requirements and taking into account the national activities.

d. Most of the research will be carried out through cost-shared projects with an average Community funding of 50 %.

   Concerted projects will also be considered, where appropriate, to encourage sharing of information and experience between well established teams from different Member States.

   The Community will also promote the development of data bases, the training of scientists and the transfer of knowledge through conferences and symposia.

e. Considering the strategic importance of materials research for the European industry, the Community R&D effort should be substantially increased to improve the strategic coherence of the national efforts which are still too fragmented and to keep up with the massive efforts in the United States and Japan.

   The effort estimated necessary for the 1987-1991 period is estimated between 200 and 300 MioECUs. This level of effort corresponds to about 20 % of the present Member States effort (excluding military research).

7. GENERAL SUPPORT FOR SCIENTIFIC AND TECHNICAL DEVELOPMENT

7.1. Innovation

The European Council has underlined the importance of reinforcing the scientific and technical foundations of European industry and of promoting its international competitiveness.

To this end, the Commission proposes to stimulate the whole innovation process in the Community through two specific fields :

- an improved dissemination and exploitation of the results of Community research, demonstration and technological development (RDTD) activities;
- a strategic programme for the transnational promotion of innovation and technology transfer (SPRINT).

7.1.1. Dissemination and Exploitation of RDTD Results

a. The proposed amendments to the EEC Treaty explicitly confirm that "dissemination and exploitation of the results of Community research,

demonstration and technological development (RDTD) activities" constitute one of the four inter-related types of action to be undertaken by the Community in the field of technology.

In the context of a Community-wide market, improved dissemination and exploitation of results will lead, throughout the enlarged Community, to an increase in general scientific and technical knowledge, a general improvement in economic competitiveness and an increase in the number of jobs created. Certain investigations indicate that, even with the scarce resources so far available, this action has already led to the creation of about three thousand (direct and indirect) permanent jobs, at a cost per job substantially lower than costs which are usual in either the public or the private sector. About half of these new jobs involve transnational activities.

b. This horizontal action will be implemented to the benefit of all regions through three lines :

1. An activity covering the dissemination of all Community RDTD results including :

   - patent screening, filing and defending, to ensure that exploitable material is protected;
   - translating Community RDTD results into several languages and providing appropriate ways and means for dissemination to the scientific community, to decision takers in the public and private sectors and to the general public.

2. An activity covering the exploitation of the JRC's R&D results: market evaluation of JRC inventions; support for constructing prototypes and pilot plants; search for industrial partners for exploitation or further development; granting licences; publicity.

3. An activity covering the exploitation of the results from all other RDTD activities as far as the Community as such is involved (shared-cost actions, including demonstration projects, COST, EUREKA and cooperation agreements with third countries, etc..) :

   - to ensure proper exploitation by adherence to the relevant legal and contractual obligations for protection, exploitation and licensing in the interest of the Community;
   - to offer selective and precompetitive support in the field of protection, exploitation and licensing, limited to certain types of contractors (research centres wholly or partly publicly owned, SMEs and universities), providing that the work has a transnational character or cannot be adequately supported by national measures and that provision is made via royalties for repayment of the Community's financial support.

The experience of the Commission's services has proved that these tasks are far better handled by an approach which enables specialized services for the protection of inventions, the dissemination of information and the exploitation of research results to be put at the disposal of individual research activities.

c. A notable strengthening of this existing horizontal action, which could be achieved at a cost modest in relation to the overall research budget, would lead to benefits far in excess of that cost.

d. In close collaboration with managers of RDTD activities, researchers and inventors and, where appropriate, the technical assistance of the JRC, the work listed under b. will be implemented - notably for reasons of competence, cost effectiveness and budgetary rules - by the Commission's specialized services (which should be adequately reinforced), assisted by external experts working under contract. Exploitation projects requiring the further development of inventions, or the realization of demonstration installations, will be carried out by external enterpreneurial bodies acting under contract with the Commission.

7.1.2. Strategic Programme for the Transnational Promotion of Innovation and Technology Transfer (SPRINT)

a. The proposed amendments to the EEC Treaty confirmed that "The Community's aim shall be to stengthen the scientific and technological basis of European industry and to encourage it to become more competitive at international level. In order to achieve this, it shall encourage undertakings including small and medium-sized undertakings, research centres and universities in their research and technological development activities; it shall support their efforts to co-operate with one another, aiming, in particular, to enable undertakings to exploit the Community's internal market potential to the full ...".

   Consequently a horizontal action is proposed aiming at the development of a European supporting infrastructure for innovation and technology transfer, particularly for the benefit of small and medium-sized enterprises (SMEs).

   It has indeed been shown that SME's are not in a position to exploit effectively the results of research and to innovate without the support of an infrastructure giving them access, across national borders, to the finance, the information and the wide range of advisory services, etc.. which they require. In this connection, it should be remembered that it has also been shown that the largest potential for innovation is to be found in SMEs.

b. It is thus fully in the interest of SME's that this infrastructure should be Community-wide, because this enables them to take advantage of the size of the European internal market.

   This action is split into three chapters :

   1. The establishment of "human networks", namely tha transnational interconnection of the various intermediaries that hold the know-how which SMEs need : technology transfer specialists, Chambers of

Commerce, technology management consultants, marketing consultants, venture capitalists, etc...

2. The development of "instruments", enabling SMEs (or the intermediairies that work for them) to have easy access to the information, originating from all Member States, which they require : technological conferences, information systems on technologies available for licensing or on the research laboratories which can provide them with support, on technical standards and specifications to be respected in each country, on research reports issued at a national level containing data which could be exploited by industry, etc..

3. Systematic concertation between Member States on measures to be taken at a national level to promote research, innovation and technology transfer, with the aim of not only enabling Member States to take advantage of each other's experiences, but also to suggest new measures to be taken at Community level.

c. The proposed action is designed to follow on from a first 3 year experiment, decided by the Council of Ministers on 25 November 1983, concerning the "Plan for the transnational development of the supporting infrastructure for innovation and technology transfer".

The Commission has been implementing this plan for over 2 years. On the basis of the experience acquired it can be confirmed that the "infrastructure" approach is essential. It has at the same time become very clear that the most important elements of this infrastructure are transnational "human networks" and an effective system of concertation between Member States.

It should be pointed out that this concertation, apart from the exchange of experience to which it leads, provides feedback into the Plan and generates specific new actions to be undertaken at a Community level.

d. The action requires both a number of preparatory studies or pilot projects and the implementation of full-size transnational operations on the basis of shared-cost contracts.

* * *

e. The financial resources necessary to carry out these activities are estimated between 80 and 150 MioECUs for the duration of the Framework Programme. Additional funding for activities relating to dissemination and exploitation of research results will come from individual programmes.

7.2 Communication and Information Networks and Scientific Data Bases

a. The establishment of Europe-wide communications and information networks is a key element to:

1. Strengthen the European research infrastructure :

   Fundamental, technological and engineering research requires good computer based communication media to help researchers

   - to work effectively while geographically dispersed, through better and quicker access to relevant information sources and improved communication with other scientists;

   - and to sharpen their fundamental research capabilities in Europe in order to use them more quickly than our competitors.

   The creation of a European integrated computer network should create a network scientific culture, initiate and intensify cooperation between separate national research groups.

2. Improve the process and speed of innovation and stimulate the industrial exploitation of industrial results, through the links and bridges provided between universities, industrial research centres, standardisation specialists and marketing people.

3. Lead to consistent approach and implementation of European common standards. (Furthermore a European Computer Network should provide a welcoming structure for EARN members when IBM finance ceases supporting the EARN network).

b. The objective is the provision of a common integrated computer communication infrastructure and associated services, using public data networks and linking the computers and individuals of universities as well as academia state and industrial research centres. It will allow exchange of data, software, messages and research results on a European-wide basis and also allow for the sharing of massive and expensive resources such as information data bases, super-computers, specialised services centres for expert systems and artificial intelligence.

   This infrastructure will build upon efforts being made in order to develop and implement OSI standards and to provide the EEC with high speed and/or broadband communication services (in the framework of ESPRIT and of RACE).

   Created under the auspices of the Commission, the RARE association (Réseaux Associés pour la Recherche Européenne) aims to provide a high quality networking infrastructure using the data services operated by the PTT's, for the support of research and academic endeavour on a European basis.

The European research network (ERN) constitutes another important European project of which the Commission is a partner. It has similar objectives. Internal discussions are currently taking place within the Commission to define its active participation and contribution.

c. Motivation for EEC action :

- use of EEC wide capabilities in R & D and contribution to the creation of the European community of researchers;

- coordinated approach required to develop and implement common standards (in liaison with CEPT);

- substantial cost savings compared to a multiplicity of incompatible national networks designed for the same purpose;

- improvement of European-wide transfer of technology, including SMEs and less favoured regions by setting down geographic barriers to access of information.

d. At this very preliminary stage, one could envisage a Community contribution of approximately 20 MioECUs. A first estimate of the actual expenditure from the different national programmes of the Community is in the order of magnitude of 80 MioECUs per year.

Furthermore part of the work which does not involve RDDT is carried out within other programmes such as INSIS and IT & T standardisation action plan.

/9274
CSO: 3698/101

FRENCH MINISTRY DESCRIBES OBJECTIVES OF 1986-88 R&D PLAN

Paris RECHERCHE TECNOLOGIE in French No 1, Jan-Mar 86 pp 9-11

[Introduction to the "Annex to Law No 85-1376 of 23 December 1985 on Technological Research and Development" issued by the French Ministry of Research and Technology]

[Text] Introduction

The Stakes Involved in Research and Development Policy

The role of science and technology never ceases to grow and diversify and this process leads to profound transformations in the R&D system. The social and economic sector of R&D exerts constantly increasing pressure on science to evolve in order to improve its competitiveness. This is characterized by an increasingly closer bond between education and research, by intensified interaction between government sponsored research and private industrial research, and by the growing importance attached to technology. The extremely rapid progress of technology is a fundamental source of change, not only in industry, but also in the development of science itself.

I. Basic Research

A. As in the past, the most spectacular phenomena are those which happen on the frontiers of scientific disciplines, particularly in molecular biology, mathematics, space science, and high energy physics.

In these last two sectors, the exploration of new areas is linked to the construction of large equipment. From this perspective, the time period now being ushered in should be particularly productive, since it will see the inauguration of the LEP (collisions between electrons and positions at the CERN) [European Center for Nuclear Research] and of the HERA (electron/proton collision ring in the FRG). The importance of these new machines is even further enhanced by the recent discoveries at CERN, and by the advances in particle theory.

With regard to astronomy, it will benefit from the opening of new observation points on the universe. Use of huge optical telescopes and space telescopes, launch of the French-German IRAM operating in the millimeter waves range, and the stream of results provided by detection satellites in the infrared, gamma,

or X spectra will permit us once again to verify the extraordinary imagination of nature expressed in the universe. With regard to the exploration of the solar system, this too is going to become a European adventure.

The explosive development of biology, particularly in its molecular and cellular components, is going to allow decisive advances in knowledge of the organization and expression of genetic material, the mechanisms of development and differentiation, the architecture and functioning of the nervous, endocrine, and immunological systems.

B. This acceleration of scientific discoveries on the frontiers of scientific knowledge is accompanied by a change in the transfer sciences, such as chemistry, biotechnology, biomedicine, and physical sciences related to engineering (mechanics, data processing, optronics, electronics). These various sciences tend to absorb a large part of the new grants and personnel because the training of the majority of the country's specialists takes place within them. And this is happening at a time when industrial firms, having acknowledged that the role of the educational system is primarily one of selection, finally understand that training must be constantly updated through contact with research.

These transfer sciences are assuming a strongly interdisciplinary character; they draw their strength from a two-way stream of new ideas provided by an increasingly demanding downstream sector, and by an upstream science sector, which their recent advances have led to study increasingly complex subjects closer to the real world. Thus, in recent years molecular biology has become able to tackle issues which are really medical research; for example, oncogenes, the study of which will permit understanding of the mechanisms of cellular transformation, an indispensable base for the progress in the fight against cancers. The fantastic advances made in the knowledge of the human genetic pool and its various manifestations has paved the way for a medical field which can--on the basis of solid molecular research opened up by the encounter between medical doctors and biologists--predict, diagnose, explain, and ultimately heal. These efforts, of course, are inseparable from the progress made in the fields of prevention and epidemiology, notably in the major pathologies (cancer, cardiovascular and nervous systems), and in the relations between health and living and working conditions. Likewise, progress in solid-state physics and theoretical chemistry has led to an in-depth understanding of the relationships between the structure and properties of complex materials and is the basis of the most recent developments in mechanics as well as in microelectronics. Finally, the efforts of mathematicians are evolving rapidly in directions which will allow them to become a fundamental factor in the progress of data processing and artificial intelligence.

C. Deep changes in the sciences of man and society are taking place under the triple thrust of (1) the use of new techniques, (2) the introduction of scientific methods, and (3) the convergence of scientific sectors--formerly quite separate--toward new fields of study: the origin and evolution of civilizations; the overall analysis of life in society. The analyses done by the human and social sciences which extend the technological and scientific effort by backing it up with human goals, are necessary for citizens, workers, and businessmen to adapt to technological change, to reconcile themselves with it, and to become part of inevitable changes, while at the same time, increasing knowledge of culture and identity which are indispensable to human development.

II. Industrial Research--The Technologies

A. Formerly a university monopoly, research has increased in goal-oriented organisms and it is now moving into the social and economic sector, most notably into industry. For a long time, it has been known that sectors such as aeronautics, electronics, and pharmacology can only survive by devoting more than 8 percent of their turnover to R&D. But it is now obvious that the need for this effort is expanding to include more traditional areas such as those of intermediate products (glass, steel, aluminum, polymers...), of capital goods (electronics, energy, mechanics, transports...). In fact, modernization and investment in research have become tightly linked in all industrial sectors.

But industry is not the only downstream sector where the future will be profoundly changed by research successes. We are thus witnessing the convergence of medicine, based on empirical foundations, of molecular biology, the parameters of which have extended in the last 3 or 4 years to include genes and human cells, and, finally, of the biotechnologies as physical-chemical techniques which are revolutionizing medical diagnosis and pharmacology. The consequences of this convergence may prove in the next few years to be as important as the impact of the advances made in physics on the electronic and materials industries in the sixties. Likewise, research in the field of nutrition is reaching maturity and has the potential to impact greatly both on health problems and on the development of agriculture and the agro-food industry. These last two fields will be heavily influenced by biotechnologies (for example, new seeds, embryonic engineering, accelerated growth of poultry and fish), but also by the application of robots (harvesting, pruning, milking), and more generally by mechanization and progress in the study of plant health and soil science.

On the other hand, business as a whole, notably the service industry, is becoming increasingly conscious of the need to consult with the human and social sciences in order to adapt to environmental change.

B. It has now become common to describe the often violent transformations which occur in products and processes to be the result of the diffusion of technologies which are spreading from the industrial sector, where they were originally developed, to all other sectors. Without going into an exhaustive listing of these basic technologies, it is necessary to mention the extensive developments in new materials; in biotechnologies (notably genetic engineering, microbiology, enzymology, cellular fusion and culture); in computer science software, data processing, knowledge processing); in communications technology and signal processing; in CAD (Computer Aided Design) and image synthesis; in computer integrated manufacture [CIM] and factory automation, etc.

In every case, the challenge will be to develop these technologies, but also to promulgate them as widely as possible. This will happen of course through educational efforts, but also by ensuring the application of mankind's new technological tools: microcomputers, software packages, robots, automations, machines with digital command, lasers, sensors, measuring equipment, etc.

C. Experimental bench tests will be necessary for the most advanced technologies: Space objects (launchers and satellites); nuclear reactors; aircraft and helicopter prototypes; some supercomputers have the advantage of being both experimental and marketable. In other areas, because the market allows only products with large scale distribution and slight industrial risk, it has become necessary to promote objects often called "synthetic," which allow the testing of new materials and new technologies on prototypes, the economic interest of which lies in the future: a successful example is the "3 liter vehicle." The choice of these large technological systems supported by special programs with government and industrial group participation is sure to become a decisive element in scientific and technical strategy.

III. The New Research Environment: A Strongly Interactive System

The R&D system has become one of the most interactive systems in existence. The notions of transfer, mobility, multidisciplinarity, and of joint and program research now form the basis of good management of this research system and of each of its components.

A. The best known of these interactions is that which must be established between university research and industrial research, but, within large industrial groups, transfers are equally difficult yet indispensable. The creation of interfaces among departments in a university or an institute and the exchange of researchers among research units have become a major concern for the people responsible for government sponsored research.

B. Also essential is the penetration of basic technologies into even the most fundamental scientific sectors. This means that the future development of these basic sciences will be disrupted, as has been the case with biology over the last few years. Three courses of action, which must be translated into the allocation of funds, result from these considerations:

--Computer equipment (particularly microcomputers and vector computers), and installation of a national computer network followed by a European network;

--Renewal of the inventory of so-called "semi-heavy" instruments, which are spreading to all scientific areas the tremendous progress of technologies most often developed in physics and chemistry laboratories. The labs which do not have these tools will soon be passed over;

--Finally, very large equipment (TGE), the use of which is beginning to spread. Formerly the exclusive domain of nuclear physicists and astronomers, this heavy equipment is spreading to all the earth sciences. This change is almost certainly due to the concepts developed in the seventies, but also to large drilling programs; to the creation of a submarine fleet for great depths; to observation satellites which are giving a permanent global view of our planet. This very large equipment is also becoming indispensable in fields where the structure of matter is the key to discovery (solid-state physics, chemistry, and, increasingly, molecular and cellular biology).

C. The interactive character of research also translates into new forms of work organization for researchers. In the last 20 years, researchers went from individual work to team work. In turn, the teams are tending to integrate themselves into networks with various names: GRECO, GIS, GIP, GIE.... Originating in the area of basic research, this phenomenon is becoming equally important in industry, where efforts in so-called "precompetitive" research are increasingly undertaken by groupings of industrial companies.

At the national level, research activities are more and more described in terms of programs. On the one hand, technological development programs have as their objective the production of industrial objects with high technological risk (in nuclear energy, space, aviation, and marine science). Other programs known as "diffusive" programs tend to spread basic technologies (materials, electronics sector, biotechnologies, and factory automation). Still others support activities in fields where modernization is going through a period of rapid growth or substantial changes in research and development (ground transportation, biological and medical engineering, pharmacology, agro-foods, chemistry, civilian engineering...). And finally, other programs deal with the effect of social and technological innovation on man and his civilization (technology-employment-work programs). All these programs, especially those of the diffusive type, are of recent vintage. Management and evaluation of these programs must be improved.

D. International cooperation constitutes a particularly exciting intermingling of the scientific community. The impressive developments in fundamental research owe a lot to the clash of ideas which occur during meetings and exchanges between researchers in countries where labor, education, and thinking are different. These exchanges of ideas, which are the only way for a competitive laboratory to assimilate immediately the discoveries in its field, are spreading rapidly to the social sciences, to technological research, and even to industrial research: present and future European programs are based on all of these factors.

These international exchanges, which often start from necessity, always turn out to be cordial and stimulating, and form the basis for the increasingly transnational character of the scientific and technical community.

E. Finally, the resurgence of the ancient requirement, at times overlooked in France, of placing the country's future R&D specialists in contact with laboratories and allowing them to receive firsthand knowledge from basic researchers, is particularly noteworthy. It is in fact vital to encourage all efforts intended to eliminate compartmentalization of the work of engineers, of universities, and of private firms. In the case of these firms, the hiring of specialists trained in this way is the best, possibly the only, way to have access to the new technologies and specializations which will ensure success. For researchers, contributing to the development of young talents through the transfer of knowledge could become as important as the production of new scientific results. Finally, for engineering schools, it is now necessary to put students in contact with laboratories of the highest quality (either their own or associated laboratories). These innovations are breaking down the traditional barriers between higher institutes, university laboratories, and laboratories of goal-oriented institutions, as well as the barriers between scientific disciplines. The rapid and total achievement of this transformation represents an imperative for our country.

8615/12859
CSO: 3698/M288

NARJES ON ROLE OF MARKETS, COMPETITION IN EUROPEAN R&D

Bonn DAS PARLAMENT in German 16-23 Aug 86 pp 1,2

[Article by EC Commission Vice President Karl-Heinz Narjes: "Europe's Opportunities Are at Stake: The Community's Research and Technology Policy Must First Prove Itself"]

[Text] European research and technology policy in the mid-1980's is on the brink of a qualitative jump. The basis for this is the Milan resolution of principle in the summer of 1985 concerning the creation of a European Technology Community, which finally found formal expression in the European Acts signed at the beginning of 1986. By tying into the Treaty of Rome, Community technology policy, the beginnings of which can be traced back to the Euratom and European Coal and Steel Community Treaty, has finally been given a basis in law that is comparable to that of transport and trade policy. Through the Luxemburg resolutions, the Commission was also given access to the necessary instruments. What is at stake here is the extensive outline programs of many years' duration, on which the Council of Ministers must agree unanimously. The transformation into concrete projects takes place with the help of specific programs, for which a simple majority of the Council is sufficient. In the meantime, the Commission has presented its proposals for a Community research and development outline program covering the period from 1987 to 1991. Once the research ministers of the member states have held initial orientation discussions on this, a decision on the basis of formal proposals is expected by the end of 1986.

In its proposal for the new outline program, which will be provided with Community funding of 10.3 billion ECU, the Commission was guided by the realization that in comparison to the earlier, fundamental change in the quality of technological progress as well as the changes in the competitive situation on the world high-technology markets, a higher degree of coherence in the research efforts of the member states and intensified joint action are indispensible. The basic assumption is the conviction that without a suitable Community response to the technological challenge, the economic and political future of Europe is itself at stake. In a world in which the mastery of technology and innovation is increasingly becoming the central parameter for activity in economic policy, growth and employment for the European national economies are increasingly dependent on the extent to which it is possible to achieve greater unanimity in this area as well.

The indications that there is no time to lose in these efforts cannot be ignored. As a number os studies have shown, European industry has fallen into the defensive with respect to its competitors on the world market in important, key technological areas:

--In the area of electronics, the United States and Japan together account for more than 90 percent of the world market for semiconductors.

--European production in the areas of information technology, telecommunications, office technology and new materials has shown lower growth rates than in the United States and in Japan every year since 1972.

--Within the OECD, the share of Community industry in the export of top technological products fell from 58 percent in 1963 to 43 percent in 1983. Although the U.S. share decreased in the same period from 27 to 21 percent, Japan increased its portion from 5 to 23 percent.

An appraisal of research and development efforts is also unsettling. In terms of its social product, Japan will be spending approximately 30 percent more for research and development through the year 1991 than the 12 EC states together. In the United States, research and development expenditures in the same period will amount to approximately one trillion ECU, compared to 460 billion ECU in the EC.

The need for more intensive European amalgamation in the area of technology becomes even more keen in view of the fact that the competitive situation on the world markets has in recent years undergone a radical change. The worldwide race by finance ministers to conquer promising fields of growth has meant that competition between autonomous companies has increasingly degenerated into rivalry between state-supported technology potentates. On all sides, and especially in the area of so-called top technology, the laws of the market are being pushed aside by the growing tendencies towards the bilateralization and politicization of trade.

Besides the aggressive industrial policy strategies of Japan, geared towards market dominance, the research- and technology-oriented rearmament efforts of the United States in particular have contributed to the insidious retreat of the market in favor of ambitions of political power. Originally motivated primarily by defense policy, these efforts are now targeted at the restoration of technological superiority over everyone else in the world. The U.S. administration is using enormous state support programs that cover nearly all areas of natural science and engineering. For fiscal year 1986-87 alone, the relevant budget requests from the Pentagon, NASA and the Department of Energy amount to $47 billion.

The explosive effect of these efforts on industrial policy can be seen first and foremost in the fact that modern defense technologies today are increasingly of a "dual use" nature. In this way, military research and technological development is also increasingly of interest for civilian applications, and vice versa. Consequently, the companies favored by the aid programs accrue considerable competitive advantages in the domain of civilian production as well, for which competitors can scarcely compensate on their

own. Another point of aggravation is that access by companies outside the United States to the results of this research is being made increasingly difficult for reasons of secrecy. The trans-Atlantic free exchange of know-how, patents, experiences and scientific data is thus no longer assured in both directions.

Nevertheless: Not Beginning at Square One

In its search for a suitable response to this technological challenge, the Community need not start at square one. Appropriate and promising beginnings already exist. Particular emphasis in this context should be put on the existing Community activities in the area of information and telecommunications technology--an area that will play an outstanding key role in future technological and economic developments.

The ESPRIT program has in the meantime become a signet for Community research assistance. The first segment of the program, planned for a 5 year period, was provided with financing of 1.5 billion ECU, half of which comes from the Community budget. Its primary goal is to assure the availability of the necessary basic technologies to European industry on the largest possible scale. Its success, which has exceeded all expectations, and the accompanying significant increase in the self-confidence of the researchers involved in it constitute a beneficial starting point for the ambitious second phase of this program, which is due to get under way in 1987.

The RACE program, which is currently in the definition phase, is for the area of telecommunications technology. Its goal is to create the technological foundations for the gradual Europe-wide introduction of integrated, wide-band communications by 1995, a project whose effects on infrastructure can clearly be compared with those involving the construction of the railroad system in the 19th century. Its success would prevent the insular effects of national solo efforts and would avert in advance costly duplicate efforts leading to incompatible results.

The BRITE program benefits the application of modern top technologies in so-called "mature" or old industries. One focal point is computer-supported planning and production, another is the expansion and development of laser technology. Thus far, this program has met with an unexpectedly animated response. There are thus plans to continue and expand it.

In addition to information technology, biotechnology represents a research area for which the medium and long-range economic implications can scarcely be measured. The need for joint research efforts in this area can be seen in the connection between developments in biotechnology and a solution to the surplus problems of European agriculture, which are in the long run insupportable. The trend of continually increasing agricultural surpluses can only be broken if opportunities for income outside the food chain are opened up to agriculture. Biotechnology could make a decisive contribution to this.

Performance and Efficiency Remain Supreme Commandment

It should be emphasized that a strengthening of Community efforts in the area of research and technology cannot be equated with a rejection of the principles of market and competition. Performance and efficiency continue to be the supreme commandment. This requirement is also kept in mind in the operational principles of the Community research programs. The fact that they take place in the pre-competitive phase of the innovation process should preserve the elements of competition and counter the increasing danger of cartel formation near the market. In addition, the programs, operating according to the principle of cost sharing, are based on the "bottom up" formulation, whereby the extensive involvement of research institutes and of industry in the planning and implementation of the programs is assured.

Rapid progress in the realization of a genuine European domestic market is an indispensible precondition for the success of the technological efforts. The Commission has never shown a trace of doubt on this point in its proposals, and it is clear that this inseparable connection has also gained recognition in the member states. It is thus proper that the 1992 domestic market goal was included in the Luxemburg Acts. In this way, it achieved the status of a type of constitutional goal.

In no other area is the connection between the domestic market and technology development more clear than in the area of public contracting. This is a market with a yearly volume of approximately 200 billion ECU, and which is moreover very technology-intensive if one considers, for example, the procurements of the telephone administrations, the defense budget, the airlines, etc. Here as well, however, reality corresponds more or less to a system of more or less completely insular national markets in which privileged purveyors to the court operate as exclusive suppliers in a closed circle. An enormous waste of resources, which is estimated at approximately 10 percent of the total value of the public contracts in the community, is the inevitable result.

Closely linked to the question of public procurement is the problem of the standardization of specifications and measurements. In view of the increasingly rapid pace of technological development, it is today more urgent than ever that common definitions and standards be found prior to the phase of product development. The alternative to this would be a permanent repeat of the painful PAL-SECAM experiences. European industry can no longer afford this type of complete fragmentation of the most interesting top markets within the Community.

With the draft of the Technological Community and the timetable for the realization of the domestic market by 1992 contained in the Commission White Book, the contents and direction of the Community response to the technological challenge have been made known. It is my opinion that Europe can withstand this challenge if it supplies the political strength for the .pa decisions that this requires. No member state is being asked here to abandon vital interests, although they are being asked to abandon efforts in their domestic policy to convert Community decisions into national policy. The obstacles are well known; they consist largely of the inertia and sluggishness of existing structures. They are the actual target of what has been called Eurosclerosis. Overcoming it is the true test of the vitality and self-assertiveness of our continent on the threshold of the coming century.

12271
CSO: 3698/30

ANALYSIS OF THE REPORT ON R&D PROGRAMS FOR GREAT BRITAIN

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 437, 10 Aug 86 pp 13-14

[Text] In Great Britain each ministry is responsible for research and development within its own jurisdiction. Therefore, the research and development policy is subordinated to the main thrust of the ministry. This decentralized system has been expanded now by a coordinating secretariat in the Cabinet Office and ministerial as well as official interministerial committees. The Department of Education and Science supervises and finances basic research through universities and research councils, while the Department of Trade and Industry supports applied research and development which is of industrial significance. The Ministry of Defense finances half of the research and development programs carried out or commissioned by the government.

An analysis of the central government's support of research and development in Great Britain (by Arthur D. Little Ltd., London) carried out on behalf of the BMFT [FRG Federal Ministry of Research and Technology] shows that lately almost all supported fields have been receiving invariable financing. Exceptions are biotechnology, environmental research, information technology, as well as technology-oriented innovations, which are able to record increasing support.

The board of directors of the British Science and Engineering Research Council has developed a strategy for the future financing of technology at three levels:

a. strengthening of infrastructures;

b. support of seven priorities:

--process engineering in biotechnology, which may be further subdivided into fermentation technology and downstream processing;

--microbial physiology;

--large-scale growth of plant and animal cells;

--plant genetics and biochemistry;

--technology of recombinant DNA;

--biocatalysis, including enzyme and cell immobilization and protein engineering;

--biosensors and bioelectronics;

c. development of specific products and processes.

Government and industry investments in biotechnology are estimated at $25-30 million for research and more than twice that for science and technology over a period of 5 years (beginning in 1983-1984). More exact figures are not available, but a comparison shows that the financial support allocated by Great Britain is less than that of the FRG. In addition, based on priorities in Great Britain, more emphasis is placed on support of the process engineering aspect of biotechnology.

8622/12859
CSO: 3698/M018

SELECTIVE INVESTMENT IN R & D RESOURCES, QUALITY, EQUIPMENT

Helsinki HELSINGIN SANOMAT in Finnish 28 Oct 86 p 2

[Article by Dr of Technology Viljo Hentinen, director of the Nokia Oy research center and Technical University data communications technology lecturer: "Emphasis on Quality in Technological Research"; first paragraph is HELSINGIN SANOMAT introduction]

[Text] To keep up with high-tech development Finland must invest in research personnel, quality and equipment in that field. Instead of equally distributing our meager resources, it is better to support research in a concentrated fashion in a comparatively few fields.

New technology has become industry's key factor in competing with others and the driving force of economic development. It is furthermore of great importance in making effective use of energy and raw materials and in reducing strains on the environment. It extensively affects the whole nation. There has been agreement on objectives and the chief orientations in the discussion on science and technology policy. The chief research appropriations have been increased 14 percent in the government's income and expenditures budget proposal for next year and university expenditures 13 percent. Hopefully the budget proposal will mark a turning point in the implementation of our technology policy.

The discussion has so far centered on quantitative issues; there certainly has bee a clear need for increasing the volume of research activities. Less has been said about the substance and the quality of these activities. Of decisive importance is the question as to how a small country's meager resources for research and development should be allocated and how to assure the acquisition of high-level research personnel.

A small country has many problems in the development and adaptation of technology. Finland's relatively small investment in research and development has often been cited. It is only 1.6 percent of the national product. In many Western industrial countries the corresponding figure is now nearly twice that.

Finland's low figure can be esplained by our industry's emphasis on basic industry.

Our objective of raising our investment in research to 2.1 percent by 1990 is scarcely sufficient to eliminate the lag and the structural change that has been effected. Many countries are indeed increasing their investment at at least the same rate.

The shortage of resources becomes even more clearly evident when we compare absolute investments. Finland's investment in research and development, about 5 billion markkas last year, is only 0.3 percent of the worldwide expenditures for research and development, 0.7 percent of the United States', 2 percent of Japan's and 4 percent of the Federal Republic of Germany's equivalent expenditures. The biggest firms, like General Electric and IBM, invest nearly 100 times more than Finland's biggest investors do in research and product development.

Small Country Can Operate More Flexibly Than Big Ones

An even bigger problem is the shortage of human resources. The relative number of engineers is indeed fairly large in Finland, about 11 per thousand inhabitants, but the absolute number is very modest in comparison with those of the big countries. It is estimated that a couple of percent of the engineer community is creating really new skills.

A small country's problem is also the fact that it has the squeeze put on it by those who manufacture products more cheaply, on the one hand, and by the high-tech countries, on the other.

Small countries have small domestic markets so, with the exception of some service industries, exports are necessary for firms. This means more problems, especially for small and medium-sized firms. We also have a very undeveloped infrastructure, particularly with subcontracted planning and production projects that demand special know-how, which are important to new technology firms.

The development of technology does not hold out a promise of anything better in the future either, rather just the opposite. Products and systems are becoming more and more complex and operational technology is more and more composed of several basic techniques. With its complexity the production of automobiles is today beginning to be what the aircraft industry was yesterday. Then too, the costs of developing new basic techniques are growing. So the technology-intensive industries require more and more sizable investments in research and development to preserve their ability to compete.

Finland's chances are, nevertheless, not as poor as they may appear to be in light of the figures and trends. A small country can, at least in principle, operate faster and more flexibly than the big countries, in which the decision-making mechanism is slow and cumbersome compared with the rapidity of technological development.

In many big countries there seems to be a tendency to set up vast, unwieldy research and development programs that are hard to change or end and from which not the best possible benefit for industry is obtainable.

Finland has several strong points, relying on which it would be well for us to push forward. We have the national State Technological Research Center which covers the different domains of technology. We already have enough universities and institutes. This is a considerable advantage. It has been demonstrated that in both the public and the private sectors it takes 10 years to set in motion a new research institute and get it into operation. The costs of establishing it can come to hundreds of millions of markkas.

There Are Already Enough Universities and Institutes in Finland

Here we have tried to find elements in our technology that are on the average better than those found in competitor countries. The productivity of research and development operations and researchers' creativity have not, as far as we know, been compared on an international basis. My own impression, which is based on rather lengthy experience in the electronics industry, is that Finnish engineers are more creative and productive than Europeans or Americans. According to my observations, foreign competitors need two, even five times more human resources than we Finns do to develop the same product.

It would in Finland be a serious mistake to copy some big country's research and product development system on a reduced scale. This has been at least indirectly proposed.

Nor can we employ the solutions adopted by other small countries as is. They differ significantly from one another and are very different in terms of background and basic premises.

One guiding principle must be the development of superior know-how in comparatively few fields instead of pursuing a policy of equal distribution of our meager resources. We must primarily support research teams and units that have already proven themselves at a high international level, that have connections with industry or other beneficiaries [of their efforts] and that are infused with a spirit of enthusiasm.

The size of our research teams must also be increased. The need for this has most recently been raised in evaluating our country's research on automation. Large gaps still separate us [from others] despite the new facilities offered us by information technology.

We ought to develop several know-how centers (centers of excellence) at which the best people in given technical domains are assembled. Technological complexes and industrial laboratories also have better chances of succeeding in the vicinity of know-how centers than elsewhere.

International Cooperation Is More and More Important

We must get our institutions of higher learning (especially the technical institutes) actively involved and their faith in the future must be restored. It is most urgent for us to raise our research and teaching institutes to the level of present-day requirements, increase auxiliary staff and raise salaries

to the same level as in industry. We will in this way be able to create the prerequisites for a rotation of personnel between industry, the technical institutes and research institutes and to ensure the acquisition of high-level researchers and instructors.

For us to make the most of the advantages of a small country, we must increase our technical and research institutes' resilience in reacting quickly to changing requirements. We must be able to redirect our human resources into research and education considerably faster and more than we have before. Interaction between research and education must also be increased both in the technical institutes and between industry, the State Technological Research Center and the technical institutes.

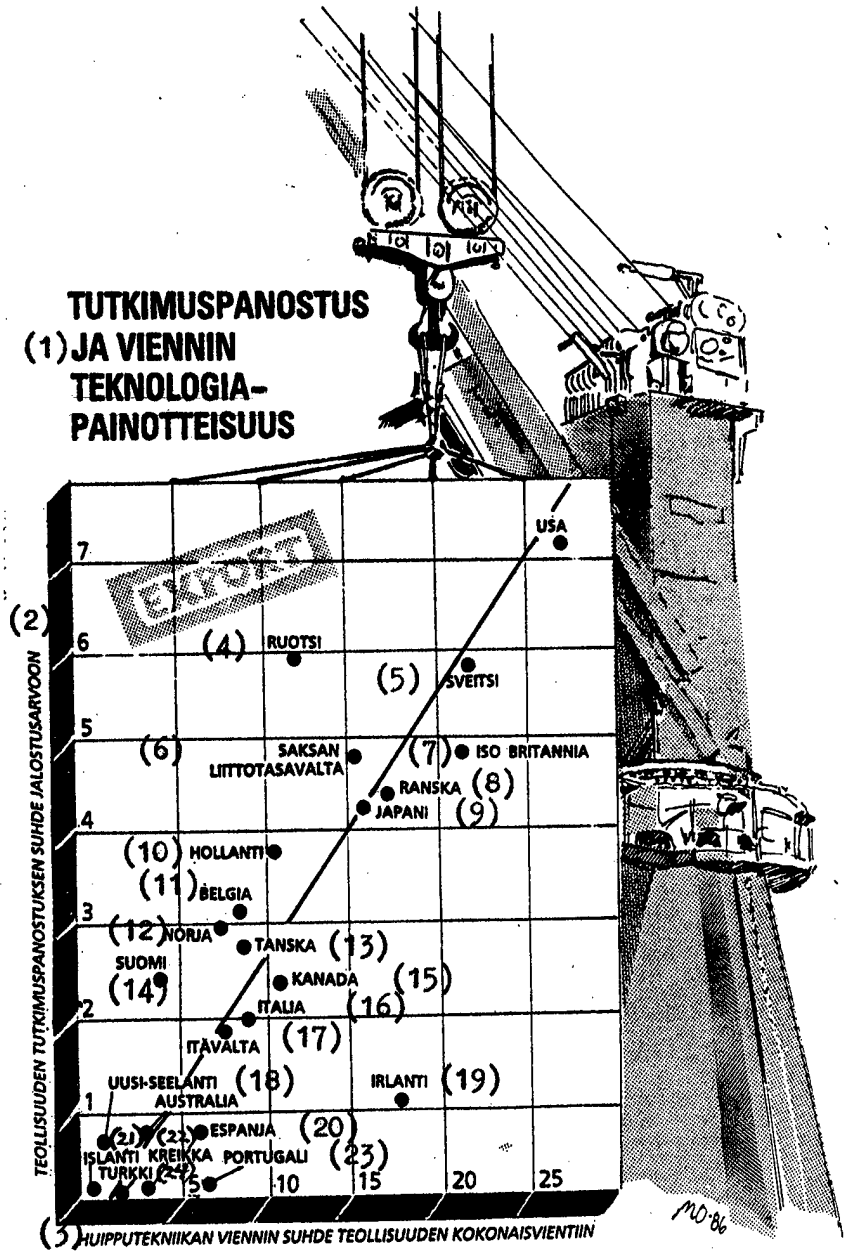
In only a few cases are we in Finland capable of being leaders in technology. Most of our firms try to keep pace with the leaders in their fields or to apply technical advances. The rapid application of basic techniques obtained from the outside to one's own products and production processes is under these circumstances decisive.

Applied research and product development will therefore be essential in the future as well. On the other hand, basic technological development should be interpreted as basic research, as it is in Japan, in which case cooperation between industry and the technical institutes would acquire a new meaning.

Industry can provide the technical institutes with incentives and new points of departure that are close to practical concerns, in basic research as well. The research institutes, on the other hand, could provide industry with ideas for new techniques and for applying them. New forms of cooperation must otherwise be accompanied by research on ordering products.

International cooperation has recently acquired new impetus. European cooperation in particular has been stepped up with many different programs (Eureka, EC-country research programs like Esprit, Race, etc.). Cooperation among firms is on the increase and acquiring new forms. We Finns must keep up with this, whether it be teaching, research or industrial activities.

As objects of cooperation, we must, however, select those fields in which we can come up with and have a chance of achieving comparable results. As for our resources, we cannot operate in conformity with all of them.


TUTKIMUSPANOSTUS
(1) JA VIENNIN
TEKNOLOGIA-
PAINOTTEISUUS
EXPORT
USA
RUOTSI
SVEITSI
SAKSAN LIITTOTASAVALTA
ISO BRITANNIA
RANSKA
JAPANI
HOLLANTI
BELGIA
NORJA
TANSKA
SUOMI
KANADA
ITALIA
ITÄVALTA
UUSI-SEELANTI
AUSTRALIA
IRLANTI
ESPANJA
ISLANTI
KREIKKA
PORTUGALI
TURKKI
TEOLLISUUDEN TUTKIMUSPANOSTUKSEN SUHDE JALOSTUSARVOON
HUIPPUTEKNIIKAN VIENNIN SUHDE TEOLLISUUDEN KOKONAISVIENTIIN

Key:

1. Investment in research and emphasis on technology in exports.
2. Industry's investment in research in relation to manufacturing cost.
3. High-tech exports in relation to total industrial exports.
4. Sweden.
5. Switzerland.
6. FRG.
7. Great Britain.
8. France.
9. Japan.
10. The Netherlands.
11. Belgium.
12. Norway.
13. Denmark.
14. Finland.
15. Canada.
16. Italy.
17. Austria.
18. New Zealand.
19. Ireland.
20. Spain.
21. Iceland.
22. Greece.
23. Portugal.
24. Turkey.

11,466
CSO: 3698/57

EEC VICE PRESIDENT ADDRESSES IFO ASSEMBLY ON TECHNOLOGICAL CHALLENGE

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 439, 15 Sep 86 pp 12-13

[Text] The topic of the scientific section of the 37th annual assembly of the IFO [Institute for Economic Research] on 26 June 1986 was Europe's technological challenge, especially from the United States and Japan. The main report was presented by Dr Karl-Heinz Narjes, the vice president of the EEC Commission. In his view, Europe should not waste any more time in formulating a common response in view of the hardly assessable consequences both of the "third industrial revolution" triggered by rapid technological progress, and of the innovation strategies pursued by the United States and Japan which have permanently changed the conditions of competition in high tech marketplaces. Europe cannot be allowed to miss what is possibly its sole opportunity for autonomy because of national egoism and political nearsigntedness. The direction and content of the common response to the technological challenge have been identified through the basic decisions of the European council for the creation of a European technology community. The time has come to transform the envisaged qualitative leap of the common research and technology policy into reality. However, rapid progress is required for the development of a common internal market. Important conditions for the development of a technological community are the liberalization of public contracts and the standardization of technical norms and standards. According to Narjes, Europe can meet the technological challenge if it can summon up the political strength required for the necessary decisions. To do this no state would be asked to give up vital interests. However, it would be necessary to overcome domestic political resistance to the transformation of Community decisions into national policies.

Otto Schlecht, state secretary in the Federal Ministry for Economics, agreed with Narjes that high tech is necessary to consolidate growth, employment, and competitiveness. He also has nothing against the related R&D subsidies on a Community level. However, he fears that through this action Bonn's efforts to reduce direct subsidies in favor of indirect subsidies would be destroyed. Schlecht also does not regret that because of the heavy burden of the EEC agricultural budget, the range of R&D financing must remain limited for the near future. "This way less nonsense will come out of the subsidy pots," he maintained.

8617/12859
CSO: 3698/M292

BMFT FUNDING OF UNIVERSITY RESEARCH INCREASES

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 437, 10 Aug 86 pp 3-4

[Text] In 1985 the Federal Ministry for Research and Technology [BMFT] made DM378 million available to universities for 1,900 research projects within the framework of its technical programs. This is more than 10 percent of the overall project aid of the BMFT which amounts to approximately DM3.5 billion. During the last 2 years, the funding of research projects at universities has been increased annually by more than 10 percent. An overall view of the distribution by field and the evolution of figures since 1982 is shown in the accompanying table.

A further increasing trend has emerged for 1986 as well, particularly because of a considerable increase of special funds for the German Research Association (GRA). This reflects the BMFT priorities such as information technology, research peace and conflict, medical and biological engineering, and deep well drilling; the execution of these programs has been undertaken by the GRA. The special funds for the GRA should total DM47 million in 1986, compared to DM15 million in 1985. Moreover, the GRA's activities directed toward financing university research will be financed at the national level by the Federal Ministry of Education and Science (BMBW).

In addition, university research will be promoted within the framework of various BMFT programs and indirectly through research institutions cofinanced by the BMFT, although this is difficult to quantify. Here are some examples:

--Large equipment for basic scientific research in national and international large-scale research institutions is widely used by university researchers. In 1986 the Federal Government will spend some DM950 million for this large equipment. In the case of equipment such as the German electron-synchrotron in Hamburg and that of the Association for Heavy Ion Research in Darmstadt, and even that of the European Organization for Nuclear Research (CERN) in Geneva and that of the Max von Laue--Paul Langevin Institute (ILL) in Grenoble, users are primarily universities.

--For the genetic research center in Cologne, the University of Cologne has obtained DM11 million over 3 years through the Max Planck Association.

In 1986, the BMFT has granted a total of DM15 million for research scholarships within the framework of international exchange programs, which also can benefit university research through scientific organizations.

--Other grants to individuals within the framework of individual specialty programs such as biotechnology and medicine go primarily to university researchers. Within the framework of these two specialty programs, a total of DM321 million is presently allocated for biotechnology and DM5 million for epidemiology and rheumatism, over a period of several years.

Allocation of Aid 1982-1985

Subsidized field	1982	1983	1984	1985
B. Special fields of basic research (particularly large equipment)	65,147.320	69,506,802	70,461,249	79,696,819
C. Marine research & engineering; polar research	8,970.539	10,525,530	20,134,234	13,507,857
D. Space research & engineering	14,848,441	18,154,883	18,923,239	19,709,134
E. Energy research & technology	55,392,420	42,178,249	47,865,043	46,296,921
F. Environmental research; climate research; safety research	26,283,849	29,126,013	38,876,863	49,150,332
G. Health R&D	24,577,280	23,884,630	24,956,911	35,588,171
H. Ergonomics R&D	10,954,360	9,472,528	8,553,031	9,011,445
I. Information technology (including manufacture engineering)	38,265,765	29,135,910	29,052,641	30,385,525
K. Biotechnology	12,506,577	19,299,958	25,256,483	31,240,318
L. Materials research; chemical engineering; physical technologies	22,447,941	29,367,994	28,601,791	26,185,043
M. Aeronautics R&D	1,026,654	892,042	4,482,559	8,136,472
N. Research & technology for ground transport & traffic (including traffic safety)	8,232,932	3,657,415	3,754,033	2,664,996
O. Geosciencies & raw material securing	9,771,169	11,117,180	12,360,294	14,644,499
P. Regional planning & urban engineering; construction research	2,214,522	1,785,403	1,285,307	878,330
U. Technical information	6,827,980	7,290,699	5,699,664	8,410,263
V. Humanities, economic & social sciences	3,031,183	2,500,152	2,908,552	2,947,899
W. Miscellaneous, not assigned to other fields	1,791	3,582	77,315	90,879
Allocation of aid from 1982-1985 (% increase over previous year)	310,500,721	307,898,969 (-0.8)	343,219,207 (11,5)	378,544,905 (10,3)
These totals also include the following amounts of institutional aid to the Central Archives for Empirical Research, Cologne Univ.:	2,090,000	2,113,000	2,129,500	2,209,500

FIAT-TI COOPERATION ON ANTI-POLLUTION DEVICES

Milan AUTOMAZIONE E STRUMENTAZIONE in Italian Feb 86 pp 94-95

[Text] A solution, which will allow compliance with the strictest EEC community limits in the area of environmental pollution and emission of noxious substances found in the unburned exhaust gases of automobile engines, has been reached by FIAT in cooperation with Texas Instruments. The primary factor in this forward step towards a "clean" automobile is the latest FIAT engine, the "Fire 1000," which already has the characteristics of fuel economy and a low emissions level, peculiar to the new generation of "lean" engines. Thanks to the use of a special device made by Texas Instruments called 20RT, which instantly vaporizes the gas droplets formed by condensation, especially during cold starts, the strict regulatory limits set for the late 1980's within the EEC community can now be met, although some countries, such as Germany, are already providing incentives and tax exemptions for early implementation of the regulations.

Small in size and powered by the car's generator, the 20RT is constructed of special materials that have the property of increasing their temperature instantly, reaching 180°-200° C. in a little more than 1 minute, so that they vaporize, on contact, the droplets of gasoline that normally form on the walls of the manifold and the cylinder and, therefore, remain unburned. The result has a favorable effect on consumption and emissions reduction during the first few kilometers, in addition to the advantage of a smoother ride.

Beginning at the end of this year, the FIAT Group models will already be equipped with "Fire 1000," that is, "Uno," and "Y 10," destined for the German market, will be equipped with the 20RT, which is installed at the time of assembly, immediately beneath the carburator, in line with the intake manifold. For the first time, an engine of standard production will fall within the new regulations, without having to resort to the more expensive solution of using a catalytic converter.

The cooperation on the "Fire 1000" between FIAT and Texas Instruments, one of the major manufacturers in the world in the electronics field (80,000 employees and a gross income of approximately 11,000 billion lire), does not stop with the adoption of the 20RT. A network of more than 250 programmable robots constitutes the "brain" that runs the automated production system--one of the most modern and advanced in the world--of the Termoli plant where the new engine is being manufactured.

9731

CSO: 3698/94

ITALY'S SGS SIGNS COOPERATION AGREEMENT WITH JAPAN'S TOSHIBA

Milan AUTOMAZIONE E STRUMENTAZIONE in Italian Feb 86 p 9

[Text] A comprehensive cooperation agreement in the integrated circuits for telecommunications was signed between the Italian SGS, one of the world leaders in microelectronics technology, and the Japanese Toshiba. According to this agreement, which will lead to a joint development of telecommunications components, SGS will, during the initial phase, grant the Japanese firm second source production rights for three telecommunications components with a very high integration sequence.

The devices manufactured by Toshiba under SGS license will be the single-chip M5913 PCM encoder; the M9910 Modem; and the PCM M088 commutation matrix capable of connecting up to 256 telephone subscribers.

The M5913 and M9910 devices, which are improvements of components already in existence, are completely compatible with present industrial standards and the M088 commutation matrix offers, if reinforced with similar devices, an easier expansion towards more complex commutation networks.

The agreement provides for SGS to supply the Japanese firm with broadcast filters plus the related technical information. For its part, the Agrate firm is examining the possibility of future agreements for second source Toshiba telecommunications products. It is understood that such devices will be manufactured and sold independently by the two firms.

A second phase of the agreement also provides for the development, both separate and joint, of ancillary components for telecommunications, particularly in the area of commutation and broadcasting. Such cooperation entails mutual access to new components that can be exchanged under license.

"This agreement," stated Piero Martinotti, head of the MOS Division of the SGS Group, "is particularly important for our company in view of the position it holds within the STET Group, the IRI holding company, which by its very nature is the telecommunications promoter in Italy."

9731

CSO: 3698/94

ITALY'S SGS PUBLISHES ITS STRATEGY FOR THE DOMESTIC MARKET

Milan AUTOMAZIONE E STRUMENTAZIONE in Italian Apr 86 pp 90-92

[Text] Combined with its business goal to attain an indisputable record in Italy, SGS [SGS-ATES Electronic Components] set out, with a series of directives grouped under the name "Objective Italy" and officially made public in Agrate on 30 January 1986 its intention to expand the strategic technological objective that constitutes the determining factor behind the mission the company has undertaken with regard to the country where it operates.

To reach such an objective, four strategies were singled out:

The operational directives set for the business and marketing strategy include a more comprehensive and widespread coverage of the market through a strong development of the local business structure and of customer technical assistance as well as of the distribution network. Special attention is to be given to the development of the internal information system, including direct connection with the company's data-base for major distributors and customers.

The use of a catalog of products reaches the business objectives in terms of market quotas through a broadening of the market itself that can be served by the company's range of products. To this effect, in addition to efforts at developing the catalog of products on a general level, a more aggressive effort has been set for the domestic market, especially in the custom, semi-custom and second source field of some items that are in demand in Italy.

The third strategy of "Objective Italy," the controlled access to technology, is fundamental in the effort to guarantee an active participation by SGS and Italy in microelectronics and as a means for the exchange of technological systems knowledge accumulated by the Agrate firm from its presence on the international scene. To this effect, direct connection of research laboratories, universities and major clients with the company's CAD center [Computer Assisted Design] will be promoted as has been done in the past. By the end of 1985 there were already nine operational hook-ups and more are expected in the near future.

Still in this context, in order to be able to guarantee controlled access to technology to small and middle-sized customers, a network of regional design centers will be established and will be especially geared for custom design circuits. The project seeks to involve local public agencies in the firm belief that these centers can become the necessary understructure for industrial growth and development.

Some design centers will have, in addition to specific equipment, facilities for providing training to outside users and space reserved for clients for direct designing, in addition to a laboratory for applied technology.

Over the next 3 years, SGS expects to be able to cover the major industrial centers throughout the nation with a network of at least six established regional design centers that will join the main research and development centers in Agrate, Castelletto and Catania.

The directives falling within the information and communications category aim at increasing the knowledge of SGS products and technology by users and the possibility of applying it in all fields of advanced electronics.

In addition, SGS wishes to make the public aware of its role, its objectives and the progress made for the purpose of attracting and motivating new human resources in accordance with the personnel development plans of the company.

In order to attain this goal, SGS has set up a busy calendar of specialized seminars for its clients and for all technical personnel in this area, scholarships for university students, guided tours of the plants and participation in conventions.

9731

CSO: 3698/94

BRIEFS

FRG SUBSIDY GUIDELINES EXPANDED--The guidelines of the subsidy program for cooperation between industry and research have been expanded in such a way that they now include subsidies for cooperation with foreign research institutions. In addition, several changes and amendments have been made which, based on the existing experience in the development of assistance, have proved to be appropriate. The goal of the subsidy program is for more researchers from industry to work in research institutions for a limited time (a maximum of 3 years) in order to acquire new knowledge and to introduce practical problems into the field of research. The employment of junior scientists (university and trade school graduates) in commercial companies is subsidized as long as they work in research institutions where scientific tasks which enhance or complement the R&D efforts of the company involved are under study. Self-supporting companies with headquarters and business operations in the FRG, including West Berlin, are eligible to apply. [Text] [Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 439, 15 Sep 86 p 7] 8617/12859

CSO: 3698/M291

BRIEFS

TURBINE PLANT IN PRC--(ANSA) Milan, November 5--The Milan company "Innse" (Innocenti Santeustacchio) has won a contract worth over 4 million dollars from the China Machine Building International Corporation to build a huge complex in Shanghai for the production of steam turbines. The installations will be used by the Shanghai turbine works and will include sophisticated equipment, numerous accessories and a positioning table for pieces weighing up to 200 tons. The complex will be built in cooperation with the local "Qiqihar" company which will supply "Innse" designed accessories and parts. [Text] [Rome ANSA in English 0824 GMT 6 Nov 86 AU] /6091

CSO: 3698/97

POLISH POLYMER RESEARCH, PRODUCTION

Katowice TRYBUNA ROBOTNICZA in Polish 15 Oct 86 p 3

[Article by Wladyslaw Lawicki: "All Is Possible With Polymers"; the first paragraph is a summary]

[Text] An artificial iris is not new for modern medicine. A less well known novelty is the artificial pupil currently used widely in the Soviet Union and the United States.

Ocular endoprostheses are today the most promising step in research and development toward polymer applications in medicine. The materials used for this purpose are such that the human body accepts them as if they were its own cells and the eye functions ideally; the proper choice of color makes it also appear entirely as if it were a natural eye.

A certain quantity of polymer irises have been made on order from hospitals and also by the Polymer Institute of the PAN [Polish Academy of Sciences] in Zabrze. The Polymer Institute has also mastered the design of the polymer pupil and has received a certificate for this solution, which at this point, however, has not yet left the walls of the laboratory. The problem is that they lack a skilled worker to make platinum clamps ...

"Studies of special materials for medicine are still in their initial stages," says Professor Dr Zbigniew Jedlinski, director of the Polymer Institute. "We will develop these efforts with broad cooperation with existing research centers abroad. Polymers have a great future in medicine. The wide spectrum of possible characteristics of these compounds, such as their easy assimilation by the human body and activities regulating various processes in the body (at a low toxicity level), open a broad road for polymers into surgery and therapy. Polymers may become substitutes for certain drugs, especially in oncology. Our institute is working, in particular, on materials for anticancer preparations. We will have to wait some time before the results are available because we are only beginning these studies, but we have assured cooperation in testing these new materials from well-known medical centers, including the Institute of Immunology in Wroclaw and centers abroad in Holland and the United States."

A Qualitative Leap

Unlike medical polymers, where we are just "teething," our synthetic structural and chemical-resistant materials are already known on a world level. The PAN Institute at Zabrze has developed a number of polymer resins known by the abbreviation SNP [segmental network polymers], which is a generic name. These polymers represent a qualitative leap in the manufacture of polymer compounds. They have a high resistance to impacts, concussions and vibrations, a high stretching factor till breakage, do not corrode and endure aggressive chemicals such as organic and inorganic acids, alkalis, various solvents and liquid fuels.

Segmental polymers, in combination with glass or graphite fibers, are an ideal material for the construction of aircraft, ships, machines, cars and for high-quality sporting equipment. Chemical-resistant resins such as SNP C-20, developed by the PAN Polymer Institute, are a good material tested in practice for the construction of chemical reactors, chemical containers, chemical equipment, plant pipelines, fermentation vessels for biotechnology, etc., i.e., all kinds of equipment exposed to organic and other chemicals.

Manufacturing chemical-resistant polymers is a profitable enterprise. In Torun, the Metalchem Factory has been constructed for the production of polymer materials and is operational. The factory has practically stopped importing polymers from Western countries and produces polymer resins mainly from materials developed at Zabrze PAN Institute. There are also possibilities for exporting these products and selling licenses. Foreign firms have shown interest in the products offered by the Torun plant, for the results of Polymer Institute are already known abroad: It has two US patents and many patent applications filed in other Western countries.

Another specialty of the Zabrze Institute is chemical-resistant polymer coatings. Developed in a joint project with scientists from Gliwice Polytechnic and exports from Metalchem Factory at Opole, these products were awarded first prize in last year's contest of the Chief Technical Organization for Material-Saving Technologies. The coatings are produced by Metalchem in Opole and serve for protection of chemical-resistant equipment. These materials allow saving tremendous amounts of steel by extending the service life of structures and equipment by many times, especially in industrialized areas, making these products resistant to corrosion. They also make it possible to utilize ordinary (and less expensive) carbon steels instead of acid-resistant steels.

From Cars to Computers

The polymers as a new type of material offer a broad range of interesting and even extraordinary properties. One of these properties is increasingly used in the motorcar industry; it is the capacity of these materials for absorbing energy. Western carmakers devise new car models using more than 30 percent polymer materials, including the components absorbing impact energy. Plastics installed at the front and rear of the car absorb the energy, protecting passengers from injury and death in case of accidents.

Another valuable property of polymers is the large scale of miniaturization of components in computers, robots and in electronics in general.

One of the areas of research conducted by the PAN Polymer Institute at Zabrze is precisely the search for new materials for electronics, computers and robots, which are the areas of progress occupying key places in the nation's economic program. These are special materials for microprocessors and components used in microcircuits. The Polymer Institute has also been awarded a large number of patents in this area.

Broad Window on the World

One hundred and fifty young scientists, most of them graduates of Gliwice Polytechnic, work in the small building of the PAN Polymer Institute at M. Curie Sklodowska Street in Zabrze. The results of their research have gained them a high level of prestige not only in Poland but in CEMA countries and many Western nations.

The institute coordinates the research of more than a dozen institutes and scores of research groups at all universities in Poland and also--in the framework of cooperative research projects--scientific research conducted by institutes and academies of sciences of all socialist countries. This primarily concerns research on chemical-resistant and structural materials. Young scientists at Zabrze are also engaged in joint projects with research groups in some Western countries--including France, Italy and Holland--which have science cooperation agreements with Poland.

This international role of the institute and broad contacts with prominent foreign scientific organizations ensures for the young scientists at Zabrze familiarity with world results and trends in the important special fields of polymer chemistry, physics and engineering.

9922
CSO: 2602/6

ACTIVITIES OF POLISH SECTION, IEEE INSTITUTE

Warsaw PRZEGLAD TELEKOMUNIKACYJNY in Polish No 4, 1986 pp 125-126

[Article by Ryszard S. Jachowicz, DSc (eng), the Board of the Polish Section of the Institute of Electrical and Electronics Engineers: "The Polish Section of IEEE"]

[Text] Taking the opportunity kindly provided by the editors of PRZEGLAD TELEKOMUNIKACYJNY, the Board of the Polish Section of IEEE would like to inform the readers of the activities and objectives of the international scientific and technical society known as the Institute of Electrical and Electronics Engineers Inc. (IEEE) and, in particular, the activities of the Polish Section of this society.

In regular communications concering the Polish Section of IEEE which we hope to place in PRZEGLAD TELEKOMUNIKACYJNY twice a year, we will report to all those interested on the current issues concerning the Polish Section and the entire IEEE.

Objectives and Activities of the Institute of Electrical and Electronics Engineers Inc. (IEEE)

The Institute of Electrical and Electronics Engineers Inc. is a society of scientists, engineers and technicians working in the fields of electricity, electronics and related specialties. The headquarters of the organization is in New York (USA).

As is probably known to most of the readers, IEEE marked its 100th anniversary last year. Although the society was created and developed on American soil, today it is an international organization with more than 250,000 members from all over the world.

Organizationally, IEEE is subdivided into 10 geographical regions. The Polish Section of IEEE belongs to Region 8, which includes Europe with the USSR, Africa and the Middle East.

IEEE also has substantive subdivisions into 33 so-called societies, grouping together specialists in particular fields. Each of the members of IEEE, regardless of their place of residence, can be a member of one or several

societies. Each society publishes at least one scientific periodical in its field. In addition, societies organize or support scientific conferences in their respective fields, initiate standardization of physical quantities or parameters, new methods or measurement procedures, as well as innovative technologies.

The principal goal of IEEE is proliferation of modern scientific and technological knowledge in the area of electrical science in a very broad sense. This goal is largely met by the publishing of some 60 specialized periodicals and several review journals in the spheres of electrical engineering and electronics, such as IEEE SPECTRUM or PROCEEDINGS OF THE IEEE. The latter periodicals carry a large number of articles solicited from prominent specialists in the field and reviewing the current state of science and engineering in the respective areas or outlining the future trends of development. It has been estimated that IEEE journals make up some 17 percent of all specialized periodicals in the world in the field of electrical engineering. Many experts believe that in qualitative terms most of these journals are at the best world level.

Polish Section of IEEE

The Polish Section of IEEE was founded in 1979 under the sponsorship of the Society of Polish Electrical Engineers [SEP] and currently numbers 60 members. The board of the section is elected for a two-year term, and the latest elections took place at the general session of the society on 12 Jun 1985.

The Board of the Polish Section of IEEE includes the following members:

- Professor Dr Wieslaw Seruga, chairman
- Professor Dr Bohdan Mroziewicz, vice chairman
- Professor Dr Andrzej Sowinski, junior past chairman
- Professor Dr Adam Smolinski, senior past chairman
- Dr Zbigniew Czyz, secretary/treasurer
- Dr Jan Nasilowski, education activities
- Dr Ryszard Jachowicz, membership development/student activities

Activities of the Polish Section of IEEE

The Polish Section of IEEE, according to the general objectives of the society, distributes information about recent developments in science and technology which have happened in Poland. One of the forms of activity in this area is organizing seminars or readings attended by outstanding scientists, who present papers on the current status of development in the world in their field of science or report their own new important accomplishments. Many of the invited speakers are foreign scientists. The seminars have an open attendance policy, while members of IEEE are invited personally.

In addition, the Polish Section of IEEE tries to make available to all those interested access to all specialized periodicals published by IEEE

(including IEEE TRANSACTIONS). On the basis of a bilateral agreement, the Polish Section receives these periodicals in exchange for supplying IEEE free of charge, with the approval of SEP, all published scientific and technical periodicals.

The library of the Polish Section of IEEE maintains a collection of all conference proceedings and some of the books published by IEEE, as well as the above-mentioned periodicals. All IEEE members can borrow materials from the library. All others can use it as a reference library.

The Polish Section of IEEE, concerned with the needs of Polish science and technology and a broader popularization of knowledge, publishes a review of the January issue of IEEE SPECTRUM as a special issue of INFORMACJE IEEE POLSKIEJ SEKCJI. This issue contains a series of articles on trends and directions of developments in the various fields of electronics and electrical engineering in the world. We believe that knowing these predictions is extremely important for economic decision-making at various levels of the national government.

How One Can Join IEEE

Every engineer (or technician with five years of working experience) working in the field of electronics or electrical engineering or with education in this field can become a member of IEEE. Engineers and scientists with significant contributions in their field of expertise can apply to become senior members.

The main obstacle to increasing the number of IEEE members in Poland is the need to pay an annual membership fee of $80. All those who can pay this fee or who have approval of their employers for covering this cost can contact the board of the Polish Section of IEEE to fill out the necessary forms for signing up.

Benefits of IEEE Membership

The main benefit of being a member of IEEE is the rapid and broad access to sources of scientific, technical and engineering information at the top world level. Each member receives:

- the periodical IEEE SPECTRUM--monthly (free of charge);
- a discount on subscriptions for journals, books, standards and proceedings published by IEEE (an average of 30 percent);
- unlimited access to holdings of the library of the Polish Section of IEEE;
- a discount in payment for participation in conferences organized by or with the participation of IEEE (approximately 25 percent, which for an average cost of a conference amounts to $40-$50).

We strongly recommend to directors of factories and research institutes to pay for membership of at least one of their employees from their hard currency quotas. In this manner, your organization will obtain direct access to the latest scientific and technical information, which is an important ingredient of present-day technical and technological progress.

[Box, p 126]

Polish Section of IEEE

Chairman, Professor Dr W. Seruga, Institute of Electrical Engineering, 28 Pozaryski Street, 04-703 Warsawa, tel. 122-000 or 120-246.

Vice Chairman, Professor Dr B. Mroziewicz, Institute of Electronic Technology, CEMI, 32/46 Alleja Lotnikow, 02-668 Warsaw, tel. 437-810.

Secretary/Treasurer, Dr Z. Czyz, 4 Sylwester Bartosiak Street, Apartment 45, 03-983 Warsaw, tel. 762-493 ext 32.

Membership Development, Dr R. Jachowicz, Institute of Basic Electronics, Warsaw Polytechnic, 15/19 Nowowiejska Street, 00-664 Warsaw, tel. 210-07-848.

Library of the Polish Section of IEEE, 15/10 Nowowiejska Street, 00-665 Warsaw, Electronics Department Building, Warsaw Polytechnic, third floor, room 328 (in the Library of the Institute of Basic Electronics, Warsaw Polytechnic), tel. 21-00-79-54. Open Monday to Friday, 8:30 am to 12:30 pm; Tuesday and Thursday, 4:00 to 6:00 pm.

The library does not lend materials by mail. No restrictions on the use of materials on the premises. Loans available only to IEEE members.

9922
CSO: 2602/7

NEW TECHNOLOGY USED IN GDR MINING, METALLURGY

East Berlin STANDARDISIERUNG UND QUALITAET in German No 7, 1986 pp 185, 186

[Interview with Dr Kurt Singhuber, Eng, Minister for Ore Mining, Metallurgy and Potash: "Commitment to New Technologies"; date and place not given]

[Text] [Question] To what extent are key technologies already being employed in your sector of the economy?

[Answer] The collectives in our enterprises and combines work with micro-electronics, computer-aided design/computer-aided manufacturing [CAD/CAM] technology, and above all with industrial robot technology to guide and direct production and to better master the management, planning, and accounting processes. About 40 percent of the practical applications of micro-electronics, for example, which are presently available or are yet to be introduced in 1986, are concentrated in metallurgy in the area of production--principally in finishing installations. Computer-aided control, especially in the predominately continuous and rapid-tempo production processes in the steel and rolling mills and the foundries and semi-finished product factories of the non-ferrous metallurgy industry, is an indispensable component of technological and operational management. This year the proportion of goods produced in installations in which micro-electronics technology is extensively employed, has already reached 63 percent in the VEB Quality and Refined Steel Combine Brandenburg. Success has also been achieved in the potash industry and in ore mining. Computer-aided and automated processes increase the production of valuable materials and metals.

[Question] Where are the focal points of this work at the present time? What is being done in your sector of the economy using domestic resources?

[Answer] There were 530 CAD/CAM work stations in the enterprises and combines of our sector at the end of 1985, and this number will double this year. Altogether, approximately 2,900 CAD and CAM work stations are to be set up by the year 1990. In this manner the course we have chosen will be logically pursued, a greater degree of production control and direction is to be achieved on the basis of microtechnology and available resources are to be technically-technologically and organizationally better utilized. That is accomplished, for example, by the combination of computer-aided systems with personal computers for the development of technologist positions, or, with the

main frames of computer centers, to ensure uniform primary data logging and data processing.

The dominating role of micro-electronics requires an even greater proportion of domestically produced micro-electronic components in our sector as well. This task challenges the knowledge and ability of the collectives. Solid, fundamental knowledge of metallurgy, of ore mining and of the potash industry is just as much in demand as the latest findings of science and technology. Only on this basis-coupled with a spirit of creativity, commitment and a willingness to produce--can the specific products of micro-technology be developed and manufactured in each respective combine. Two basic themes of the working people promote development in this area especially strongly: One is the connection between higher productivity and better working conditions, and the other is the new dimensions of change brought about by microelectronics.

Already completed projects, for example the start-up of the circuit board centers in the VEB Mansfeld Combine Wilhelm Pieck and in the VEB Central Industrial Installation Construction Combine for Metallurgy, confirm the collectives' efficiency. The successful work on steering and regulating devices, which come out of the combines' rationalization equipment construction programs and are tailored for each specific industry, is to be included as well.

At present there are approximately 250 computer-aided solutions available in production management, planning, and operations, which, for the most part, find multiple applications. By the end of the year there should be some 400.

[Question] In what results are these efforts reflected?

[Answer] The use of micro-electronics is primarily aimed at greater work productivity and a reduction in man-hours and material usage, as well as at ensuring quality. This year alone 14 percent of the planned man-hour reductions by scientific-technical means was achieved by CAD/CAM technology. The continuous wire mill in Brandenburg was equipped with a computer-aided quality control system. In addition there is the single-coil pursuit process, also a self-developed, made-to-order solution. Because of these the wire mill's productivity increased by 6 percent. An additional 4,000 tons--that is approximately 13,000 km of wire with a diameter of 7 mm--are made available annually for further processing.

In 1985 jobs for 11.5 percent of the working people of the ore mining, metallurgy and potash sector were created or redefined. Through the use of industrial robot technology alone, physically demanding activities were eliminated for 1,065 working people, while noise was reduced for 1,482 workers and high temperatures for 516 workers.

Already in 1970 the basic functions of accounting, production plan formulation, the provision of operating supplies, and accounts settling were beginning to be systematized with the aid of electronic calculating machinery. That results in a considerable time savings, and above all contributes to better management

of the entire process of providing goods on schedule and in sufficient variety within the framework of state resource allocations.

[Question] New technologies require, above all, serious commitment on the collectives' part. Which requirements are to be met by the workers?

[Answer] Irrespective of how one comes into contact with key technologies, they make great demands on the individual. In metallurgy new professions are gaining in importance, for example: automation technician, equipment operator, electronics technician and software developer. Job characteristics and work requirements for a series of occupational groups are completely changed. At the same time the responsibility of the individual for the functioning and quality and capacity utilization of automated equipment is growing.

The most important management principle is therefore thorough, timely consultation with the working people concerning all the effects of the employment of new technologies. In this way one succeeds in developing and promoting commitment, in passing on existing experiences, and in strengthening willingness to undergo vocational training. The advantages of new technologies and the influence of increased productivity on the development of the entire national economy must be explained just as well as the necessary transition to a more extensive shift system or the "love of truth" of the computer, which always requires clear decisions and can only comprehend a "yes" or a "no."

[Question] What influence do the key technologies exert upon the social environment of production?

[Answer] The application of key technologies frees man from certain monotonous activities as well as from a series of burdens. But the demands are not becoming less. Everyone is needed-despite man-hour savings, accelerated production processes and automated, non-labor intensive manufacturing. It is an advantage of our social system that a new, suitable job is available for everyone. We have already proven that repeatedly in our own sector of the economy, as in the construction of the converter steel mill in Eisenhuettenstadt.

13238/12851
CSO: 2302/13

END